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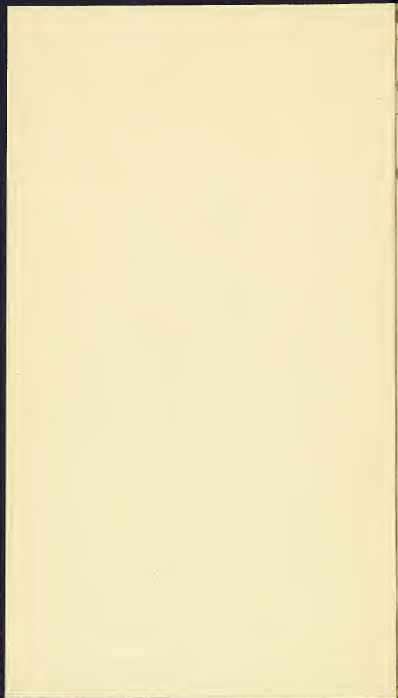
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A TREATISE
ON THE
AGRICULTURAL GRASSES.

BY EDMUND MURPHY, A.B.,

Landscape Gardener and Improver of Estates, Editor of the "Farmer's Gazette," &c.

One way a hand, select from forage drives
A herd of beeves, fair oxen and fair kine,
From a fat meadow ground.

PARADISE LOST.

DUBLIN
WILLIAM CURRY, JUN. & COMPANY,
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1844.

PURDON, PRINTER, 23, BACHELOR'S-WALK, DUBLIN.

TO THE FARMERS OF IRELAND

THIS HUMBLE EFFORT

TO RENDER FAMILIAR TO THEM

AN IMPORTANT

BUT HITHERTO MUCH-NEGLECTED

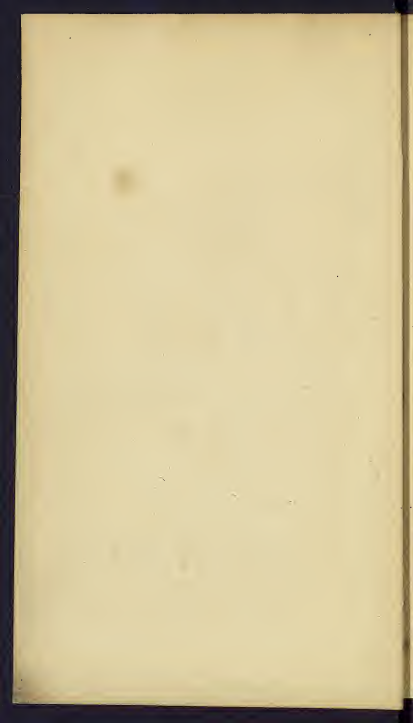
BRANCH OF THEIR PROFESSION,

IS MOST RESPECTFULLY

Dedicated

BY THEIR DEVOTED SERVANT,

EDMUND MURPHY.



P R E F A C E.

WE had long been impressed with the conviction, that an acquaintance with the nature and properties of the more important of the agricultural grasses would be advantageous to farmers, and were aware that few of them have devoted the degree of attention to the subject necessary for obtaining that information; but it is only within the last three years—since we commenced the publication of the *FARMER'S GAZETTE*—that we have been made aware of the anxious desire of farmers, in this respect, to turn over a new leaf, and to render themselves familiar with this and other scientific branches of their profession. So numerous were the inquiries forwarded to us on this subject during the first year of our editorial labours in the *GAZETTE*, that early in the second, viz., in the spring of 1843, in order to relieve ourselves from the necessity of incessant repetitions, which would have occupied a considerable portion of our time, we announced our intention of preparing a cheap and simple treatise adapted to farmers, and by means of which they might obtain at least a clue to information so extensively and earnestly desired: similar works by others, both in this country and on the other side the Channel, were, however, announced for publication before we could obtain leisure for the fulfilment of our promise, and we willingly relinquished our intention, in the expectation that the desideratum would be supplied by the greater leisure and superior ability of those by whom it was undertaken; but the authors of these works, which are valuable and excellent in their way, not adopting the plan we had proposed to ourselves, and the inquiries of our correspondents

continuing nearly as numerous as ever, we have been induced by snatches, and amidst avocations which demand constant attention, to resume the little treatise which we had laid aside, and which we now, although conscious of its many and great imperfections, venture to lay before the public.

There are very many, as we have reason to know, who, with us, consider an acquaintance with the more important grasses an essential item in the education of the scientific farmer. To such it is unnecessary to propose any additional motives for perseverance in the acquisition of this species of knowledge: they read or hear accounts of crops of hay, and of produce in beef, mutton, milk, butter, and wool, far beyond what their land produces; an opportunity presents itself of examining into these statements; they are confirmed, or, at all events, the examination satisfies them, not only that the herbage of these productive fields is altogether different from theirs, but they trace this superiority to the effect of shelter, draining, subsoiling, enriching, and laying down with the superior grasses, and return determined, if possible, and at any expenditure of labour, to render their farms in like manner profitable. And if this degree of knowledge be necessary for the farmer, how much more necessary is it for agriculturists and stewards, on whose knowledge and zeal depend not only their own success, but the success of the important interests committed to their care; to such we hold an intimate acquaintance with the grasses indispensable.

Many "practical" farmers there are, no doubt, who would feel disposed to ridicule that "theoretical" hair-splitting, as they would call it, which out of the Bruimscan (the Irish for grasses with creeping roots), the Trahneen (those with wiry stems), the Raithleah (those with spiked heads), and the Fear Seasglar (strong

sedgy kinds) of our ancestors, could form more than one hundred so-called distinct kinds. To such a farmer

The Trahneen on the streamlet's brim,
A simple Trahneen is to him,
And it is nothing more;

but happily, as we have no doubt it will prove, the schoolmaster is abroad, and his influence, it delights us to perceive, is about to be still farther extended in this country: under his salutary discipline, opinions, such as those to which we have referred, will daily give way to more rational views; and the farmers of this country will, at no distant period, rank in knowledge, as they do in natural intellect, amongst the most favoured.

It is usual, in treatises of this nature, to endeavour to trace the progress of the art or science under review from its origin upwards. It shall suffice us, however, to state, that this branch of agricultural knowledge, so far as regards those to whom an acquaintance with it would appear to be of the greatest importance—namely, farmers—is, in this country at least, we might perhaps say in the United Kingdom, still in its infancy.

In the early transactions of the Royal Dublin Society, and in the Statistical Surveys of the counties, published under its auspices, will be found many references to the cultivated grasses; and a considerable impulse was given to the subject by the publication in 1807, by Mr. White, one of the under gardeners in the Society's Botanic Garden, at Glasnevin, of a Treatise on the Grasses, in which was contained descriptions of the more important kinds, interspersed with practical observations, which, considering the period when it appeared, was highly creditable. In England, the grasses engaged the attention of sundry correspondents of the Board of Agriculture, and of the Bath and west of England Society, &c., and in the Transactions of the Highland Society, even at this early period, will be found

many valuable papers on this subject. Curtis, Knapp, Young, Dickson, Anderson, Marshal, and others, devoted particular attention to it; and in 1824 appeared Sinclair's great work, the *Hortus Gramineus Woburnensis*, which embraced the whole subject, and left little to be added by succeeding writers. Since that period, as will appear by a reference to any of the agricultural periodicals, the grasses engaged the attention of many scientific agriculturists, conspicuous amongst whom stands the name of Lawson, of Edinburgh. A valuable work, in which the whole of the Scottish grasses are figured, has recently been published by Doctor Parnel, of Edinburgh; and Mr. Moore, the scientific curator of the Royal Dublin Society's Botanic Garden, last year published a fasciculus of dried specimens of the grasses, well calculated to facilitate the acquisition of this branch of knowledge.

Notwithstanding this mass of scientific and practical information already in print, a plain cheap manual of the grasses for the use of farmers, appeared to be a desideratum; this we have attempted, with what success we must leave others to determine.

We have divided the essay into three parts:—In the first descriptions are given of the whole of the British and Irish grasses; the second contains figures and details of those considered most important to farmers; and in the third we have brought together various subjects connected with the Management of Grass Lands.

The Figures are from sketches drawn from Nature by Mr. J. Duffus, Curator of the Royal Dublin Society's Agricultural Museum.

It remains to state, that we have prepared, price 2s. 6d., a hortus siccus, or dried specimens of twenty-four of the more important grasses, as an Appendix to this Treatise. To be had at 23, Bachelor's-walk, and of all Booksellers.

Rosemount Cottage, Artane,
August, 1844.

INTRODUCTION.

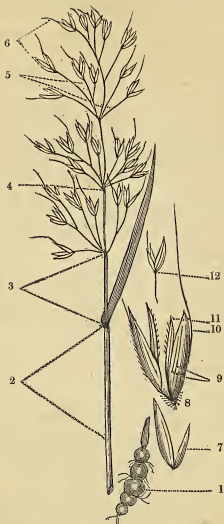
THE Grasses form a natural family, closely allied to each other in general character and appearance, belonging, with very few exceptions, to the third class in the Linnæan or artificial arrangement, Triandria (being furnished with three stamens), and to the second order or division of that class, Digynia (having two styles or pistillums), and in what botanists call the "natural classification" to the (Monocotyledonous) class, including plants which present, as they rise from the seed, only a single seed-lobe or leaf; and to the family Gramineæ, the most important tribe of plants to man, including, as it does, not only bread, the staff of life, but the principal portion of the food of his domestic animals, the sugarcane, &c., &c.

Of the Grasses, correctly so called, excluding not only what farmers have called the "Artificial Grasses," such as Clovers, Lucerne, &c., but also the natural family of sedges and plants allied to them (Cyperacæ), and which contains nearly 300 species; there are, according to Loudon's *Hortus Britannicus*, 158 genera, and 1070 species found in the various parts of the globe. Of this immense number about 116 are found in the British isles; of these 109 grow wild in England, 96 in Scotland, and 82 in Ireland, amongst which there are hardly a score hitherto considered deserving of cultivation, while about half that number, as it will be seen, suffices for the ordinary purposes of agriculture.

We have, both in the scientific and practical portions of this treatise, endeavoured, to the best of our ability, to adapt our phraseology to farmers, the class for whom it is more especially intended; but as, in treating on a subject new to many of them, terms will unavoidably occur requiring explanation, we shall here define such of them as occur to us; and in this we shall be assisted by referring to the annexed figure of the bulbous-rooted variety of the Tall Oat grass, or Pearl grass, (*Arrhenatherum avenaceum*), with which, as a vile weed, most farmers are acquainted. In this figure the bulbs, with the fibrous roots protruding from between

them, are represented at 1; 2, the *leaf-sheath* surrounding the *culm* or stem; this sheath is often terminated by a membranous strap-shaped appendage called the *ligule*, it is not conspicuous in the Tall Oat grass, but is represented in the Rough-stalked Meadow grass, (Figure 6, p. 47,) which it serves to distinguish from the Smooth-stalked Meadow grass; 3, the *culm* or stem; 4, the *rachis*, or common flower-stalk; 5, the spikelets, which, in this case, are both *simple* (unbranched) and *compound* (branched), and sit in *whorls* (clusters) on the *rachis*, thus forming a *panicle*; 6, the flowers; 7, the calyx, with its two glumes of very unequal size, as seen through a pocket magnifying-glass or microscope; 8, the floret when the calyx has been removed; 9, the *lateral ribs* of the *outer valve* of the *corolla*; 10, the bent *awn* arising, in this case, from below the centre of the valve; 11, the *inner valve* of the corolla. In the plant under notice there are two florets in each calyx—the one (which we have been describing, and which has the long awn) *barren*, that is, without perfect seed; the other *fertile*, and attached to the lower barren one by a hairy foot-stalk, as represented in the figure. 12 represents the flower in its natural size.

The object aimed at in these definitions, and in part first of this treatise, is, to enable the young farmer, or any one unacquainted with a grass, to ascertain its name, and thereby to possess a clue to any information that may exist with respect to it; with this view the grass (being in blossom) is first referred to the section containing one, two, or more flowers in a single calyx; this point being determined, and also whether it have a crowded, a loose, or a spiked panicle, the glumes of the calyx, the corolla, the presence or absence of an awn, the presence or absence of ribs on the glumes or corolla, &c., the ligule, the roughness or smoothness of the culm, the shape of the leaf, &c., &c., will all be found to afford marks by which the investigation will not only be facilitated, but this habit of close examination and attention being carried into the ordinary business of farming and of life, can hardly fail to be productive of highly important advantages.



TALL OAT GRASS, or PEARL GRASS.
(Arrhenatherum avenaceum.)

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TREATISE ON THE GRASSES.

PART I.

CONTAINING THE BOTANICAL DESCRIPTIONS OF
THE BRITISH AND IRISH GRASSES.

GENERIC CHARACTERS.

DIVISION I.—*Calyx containing only one flower.*

SUB-DIVISION I.—*Panicle so crowded as to appear
spiked.**

1. ALOPECURUS. *Calyx* of two sharp-pointed glumes. *Floret* of one valve, having a long awn inserted below its centre.
2. PHLEUM. *Glumes* pointed or awned. *Floret* of two membraneous valves much shorter than the calyx, the outer one occasionally terminated by a minute awn; base of the floret without hairs.
3. AMMOPHILA. *Glumes* narrow, sharp-pointed, and keel-like. *Valves* of the corolla nearly as long as the calyx; the outer tipped with a short awn. Margins of the leaves turned inwards.
4. ANTHOXANTHUM. *Glumes* of the calyx very unequal. *Floret* much shorter than the calyx, having both its valves awned; stamens two.
5. PHALARIS. *Floret* hairy at the base, and having from two to four membraneous valves. *Leaves* broad. *Ligule* prominent.
6. LAGURUS. *Glumes* long, spreading, membraneous, and terminating in feathered awns. Outer valve of the corolla with three awns.

* Phalaris arundinacea has a spreading panicle.

SUB-DIVISION II.—*Panicle more or less spreading.*

7. POLYPOGON. *Panicle* dense, bristly. Both glumes of the calyx and the outer valve of the corolla terminating in long rough awns.
8. STIPA. Outer valve of the corolla rolled inwards, and terminated by a very long twisting awn.
9. AGROSTIS. *Panicle* spreading. *Glumes* nearly equal in length, sharp-pointed, and awnless. *Floret* of two very unequal valves, much shorter than the calyx, its base sometimes furnished with a minute tuft of hairs.
10. ANEMAGROSTIS. *Panicle* spreading. *Glumes* unequal, the outer the smaller. The outer valve of the corolla having a long awn arising from a little beneath its summit.
11. CALAMAGROSTIS. *Panicle* loose. Base of the corolla surrounded by hairs, its outer valve awned.
12. MILIUM. *Panicle* spreading. *Glumes* equal in size, concave, three-ribbed, and nearly smooth, especially at the keel. *Corolla* similar in shape and size to the calyx; awnless, and permanently investing the seed.
13. GASTRIDIIUM. *Panicle* branched, yet compact. *Glumes* swollen and polished at the base, their edges membranous. *Corolla* much smaller than the calyx; the outer valve downy, with a rough twisted awn.

DIVISION II.—*The Calyx containing two flowers, rarely three.*

14. MELICA. *Panicle* drooping. *Glumes* unequal, membranous, ribbed, and awnless. *Corolla* of two firm awnless valves, the outer having seven ribs.
15. MOLINIA. *Panicle* erect, compound. *Corolla* awnless, much longer than the *calyx*. Leaves hairy on the inner surface.
16. AIRA. *Glumes* of equal length. *Corolla* awned—the awn arising from below the centre of the outer valve, except in *A. Caryophyllea*, in which it arises from above the centre.

17. CATABROSA. *Glumes* of the calyx blunt. *Florets* notched at the extremity, awnless, blunt, much longer than the calyx.
18. AIRACHLOE. *Glumes* sharp-pointed. *Florets* awnless, not longer than the calyx; outer valve three-ribbed.
19. HOLCUS. *Glumes* longer than the corolla. *Corolla*, with its larger valve in one or both the florets, awned; awn not prominent, and arising from a little beneath the summit.
20. ARRHENATHERUM. *Glumes* smooth and very unequal. The lower floret with a prominent awn inserted a little above the base; the upper floret with an inconspicuous awn inserted a little below the summit.
21. HIEROCHLOE. *Glumes* broad, sharp-pointed, keel-like, membranous, and awnless, without lateral ribs, containing one perfect awnless floret, and two barren florets which are slightly awned.
22. SESLERIA. *Glumes* nearly equal, sharp-pointed. Inner valve of the corolla notched or fringed; the outer with three teeth, the central tooth prolonged into a short awn.
23. PANICUM. *Calyx* of two very unequal-ribbed glumes, containing one perfect, and one imperfect floret. *Corolla* of the perfect floret, with equal, sharp-pointed, awnless, membranous valves, finally becoming a horny covering to the seed; the corolla of the imperfect floret of the same texture as the calyx, and sometimes more or less awned.

DIVISION III.—*Calyx containing three or (mostly) more flowers.*

24. DACTYLIS. *Panicle* distantly branched, flowers tufted. *Glumes* unequal, sharp-pointed, and hairy. Outer valve of the corolla much larger than the inner; hairy along the mid rib, which is prolonged into a short awn.
25. CYNOSURUS. *Glumes* terminating in awns. A comb-like appendage of many pairs of glumes

at the base of each spikelet. Outer valve more or less awned at the summit; the inner cloven at the point, and awnless.

26. ARUNDO. *Glumes* unequal, pointed, and awnless. Inner valve of the corolla much shorter than the outer; the foot-stalk of the second floret beset with long hairs.
27. BRIZA. *Glumes* nearly round, three-ribbed. Outer valve of the corolla broad, awnless, lobed at the base, and without lateral ribs.
28. TRIODIA. *Glumes* nearly equal, sharp, and awnless. *Florets* not protruding beyond the calyx. Outer valve of the corolla cloven at the summit with an intermediate dorsal tooth or awn. Sheathes of the leaves crowned by a tuft of hairs.
29. POA. *Glumes* unequal—three-ribbed in some species; in others the lateral ribs are wanting. *Florets* awnless; in some species hairy at the base. Outer valve of the corolla keel-like, compressed, three, five, or seven-ribbed.
30. BROMUS. *Florets* membranaceous, and cloven at the summit. The outer valve furnished with a strong awn, which takes its rise a little below the summit; inner valve fringed. *Styles* arising from below the summit of the ovarium. *Ligule* of the upper leaf-sheath prominent.
31. AVENA. *Glumes* not less than seven-ribbed. *Florets* awned, the awn arising from beneath the centre, and two inches long.
32. TRISETUM. *Glumes* very unequal. *Floret* hairy at the base. The outer valve five-ribbed, having a long awn arising from about its centre.
33. FESTUCA. The outer valve of the corolla terminating in an awn. *Root-leaves* not broader than those of the stem.
34. BUCETUM. *Florets* membranaceous at the summit, occasionally awned, the awn arising from beneath the summit of the outer valve; inner valve minutely and closely fringed. *Styles* arising from the summit of the ovarium. *Ligule* of the upper leaf very short.

SUB-DIVISION III.—*Inflorescence, a spike.*

35. TRITICUM. *Spikelets* without foot-stalks, or nearly so, and arising alternately on each side of the common stalk. *Calyx* of two opposite glumes.
36. ELYMUS. *Spikelets* in pairs on each side of the common stalk. *Calyx* of two glumes, situated parallel to each other.
37. HORDEUM. *Spikelets* in threes, arranged alternately on the toothed common stalk. *Glumes* terminating in long, rough, bristly awns. *Calyx* one-flowered.
38. LOLIUM. *Spikelets* without foot-stalks, arising alternately on each side of the common stalk. *Calyx* a single glume.
39. NARDUS. *Spikelets* without foot-stalks of one floret, arranged on one side of the common stalk. *Calyx* wanting.
40. ROTTBOLLIA. *Spikelets* without foot-stalks, arranged on each side of the common stalk. *Calyx* containing only a single flower, and opening only whilst in flower.
41. SPARTINIA. *Spikelets* compound. *Glumes* two: the outer sometimes the smaller, narrow and pointless; sometimes the larger, with a rough straight terminal awn: inner cloven at the summit, with more or less of an intermediate tooth.
42. KNAPPJA. *Spikelets* single-flowered, without foot-stalks, except two or three of the lowest, which are alternate. *Glumes* single-ribbed, awnless. *Corolla* very hairy, fringed, and awnless.
43. CYNODON. *Spikes*, several on the top of the stem. *Calyx* single-flowered. *Glumes* lance-shaped, spreading, awnless. *Corolla* unequal and awnless, the outer valve much the broader.
44. DIGITARIA. *Spikes* several, alternate, crowded on the top of the stem. *Calyx* single flower. *Glumes* three, very unequal and awnless. *Corolla* of two unequal, elliptical, awnless valves, which finally become a horny covering to the seed.

SPECIFIC CHARACTERS.

Those marked thus (*) are not found wild in Ireland.

DIVISION I.—*Calyx single-flowered.*

SUB-DIVISION I.—*Head or panicle compact so as to appear spiked.*

1. ALOPECURUS. Foxtail grass.

A. pratensis. Common Foxtail grass. Fig. 2.

Head of an oblong oval shape. Stem smooth. Awn twice the length of the corolla.

A common grass, and valuable for both pasture and meadow.

**A. alpinus.* Alpine Foxtail grass.

Head oval. Awn scarcely longer than the calyx.

Upper leaf-sheath inflated, and thrice as long as its lance-shaped leaf.

Found on the Scottish mountains.

**A. agrestis.* Slender Foxtail grass.

Head slender, tapering. Glumes sharp, smooth, and united nearly to the middle. Awn twice as long as the calyx.

Found occasionally in England; but not in Scotland, according to Murray.

**A. bulbosus.* Bulbous Foxtail grass.

Glumes sharp-pointed, downy, not united at the base. Root tuberous.

Found in salt marshes in England; rare.

A. geniculatus. Floating Foxtail grass.

Head cylindrical, stem bent at the joints. Glumes blunt, slightly hairy, and fringed. Awn inserted below the middle of the corolla, and twice its length.

Common in watery places. Said to be disliked by cattle.

**A. fulvus.* Orange-spiked Foxtail grass.

Stem bent at the joints. Awn about the same length as the calyx.

This grass, which appears scarcely to differ from the last, is found in ponds and ditches in various parts of England and Scotland.

2. PHLEUM. Catstail grass.

P. pratense. Catstail grass or Timothy grass. Fig. 3. Head cylindrical. Glumes broad, abrupt, fringed on the keel (midrib), and terminated by an awn scarcely half so long as the glume.

Common in deep rich meadows, &c. A most valuable grass. Said to have been introduced from America. We have no doubt, however, that it is an indigenous grass.

P. arenarium. Sea Catstail grass.

Head slightly branched. Glumes lance-shaped, thrice the length of the floret. Annual.

Not uncommon on sandy sea-coasts.

**P. alpinum.* Alpine Catstail grass.

Head of an oblong oval shape. Calyx awned, the awns as long or longer than the glumes.

Found on the Scottish mountains. Rare.

**P. Michelii.* Michel's Catstail grass.

Glumes lance-shaped, strongly fringed on the back.

Found on the Clova mountains (Scotland).

**P. asperum.* Rough Catstail grass.

Stem very leafy, often branched. Glumes wedge-shaped, tipped with a small rigid point.

Found in the western and midland counties of England.

**P. Boehmeri.* Purple-stalked Catstail grass.

Stem not very leafy. Glumes lance-shaped, downy at the keel, and bristle-pointed.

Found in Norfolk and Cambridge.

3. AMMOPHILA. Sea-bent, or Mat grass.

A. arundinacea.

Edges of the leaves rolled inwards and sharp-pointed.

Common on sand banks on the shore, and useful for retaining the sand.

4. ANTHOXANTHUM. Sweet Vernal grass.

A. odoratum. Flowers longer than their awns. Base of the leaves hairy. Fig. 10.

A common grass and valuable for pasture in light land.

5. PHALARIS. Canary grass.

P. Canariensis. Cultivated Canary grass.

Head oval. Glumes boat-shaped. Floret having two lance-shaped leaves at its base.

A native of the south of Europe and the Canary Islands, but naturalized in these countries. "Canary seed, as we see it, is not only the seed of this plant, but invested closely (as all grass seeds are) with the pericarp (seed vessel), and that again with the hardened corolla which occasions its glossy appearance."—*Hooker*.

P. Arundinacea. Red Canary grass (*Digraphis* of some).

Panicle branched, narrow, often five or six inches long.

At the base of each floret there are two minute valves or leaves which terminate in tufts of hair. A coloured variety of this grass, common in gardens, is called Ribband grass.

Not uncommon on the margins of rivers, ditches, &c., where it is very useful for securing the banks of streams and rivers liable to be washed away. Cattle are fond of it; and as it produces a great weight of herbage, it might be cultivated with advantage in land which cannot be drained.

6. LAGURUS. Harestail grass.

**L. ovatus*. Oval-headed Harestail grass.

Glumes fringed and prolonged into feathery awns.

Found on sandy ground in Guernsey.

7. POLYPOGON. Beard grass.

**P. Monspeliensis*. Annual Beard grass (*Agrostis panicea* of Lin.)

Panicle rather crowded, and having a silky appearance.

Awn straight, and three times the length of the calyx; the glumes of which are rough and rather blunt.

**P. litoralis*. Perennial Beard grass.

Awn straight, and about the length of the glumes of the calyx, which are sharp and nearly smooth.

Found in Norfolk and Essex.

8. STIPA. Feather grass.

**S. pennata*. Common Feather grass.

The long feathery awns of this elegant grass at once distinguish it from all others.

It is said to have been observed growing wild near Kendel, in Westmoreland, but it is not found there at present.

It forms a handsome object in flower gardens.

9. AGROSTIS. Bent grass.

A. vulgaris. Fine Bent grass.

Branches of the panicle smooth. Outer valve of the corolla three-nerved. Leaf-sheath smooth, and terminated by an extremely short, blunt ligule.

Common on dry heathy land, &c.

A. alba. Fiorin, or Marsh Bent grass. Fig. 7.

Branches of the panicle rough and crowded at the origin of the main divisions. Outer valve of the corolla five-nerved. Leaf-sheathes rough, and terminated by a long sharp ligule.

Common in moist land, ditches, &c.

A most valuable grass for reclaimed land, &c.

The following, viz., *Agrostis stolonifera*, *latifolia*, *angustifolia*, *aristata*, *sylvatica*, *palustris*, *purpurascens*, and *vivipara*, of some authors, are considered mere varieties of the *alba*.

A. canina. Brown Bent grass.

Corolla mostly wanting one of the two valves. Awn arising from below the middle. Leaves linear. Leaf-sheathes smooth, and terminated by a long ligule.

Common in moist moory land.

**A. setacea*. Bristle-leaved Bent grass.

Panicle short, close. Glumes lance-shaped, rough at the keel. Outer valve of the corolla with a long, bent, twisted awn arising from its base.

Found on the Downs in the south of England.

10. ANEMAGROSTIS. Silky Bent grass.

**A. spika venti* (formerly *Agrostis spika venti*).

Awn arising from a little below the summit of the outer valve of the corolla, and more than three times its length.

Found in various places in the south of England.

11. CALAMAGROSTIS. Close-reed.

C. epigegos (formerly *Arundo epigegos*). Wood Small-reed.

Glumes of the calyx awl-shaped. Corolla with an awn inserted about the centre of its outer valve, and scarcely extending beyond the calyx. Hairs finally much longer than the floret.

In ditches, &c. Rare. Dunboe, county Derry.

**C. stricta* (formerly *Arundo stricta*). Small Close-reed.

Panicle erect, close. Glumes broadly lance-shaped.

Awn arising from below the centre of the outer valve of the corolla, and scarcely overtopping the glume.

The florets are scarcely half as large as those of *Lapponica*.

Found near Forfar, in Scotland.

C. lapponica. Lapland Small-reed.

Panicle erect, close. Glumes lance-shaped, a little rough on the keel. Corolla as long as the calyx, with an awn inserted near its base.

Found in the county Antrim, north of Ireland, by Mr. Moore, the able Curator of the Royal Dublin Society's botanic garden.

Not found in England or Scotland.

**C. lanceolata*. Purple-flowered Small-reed.

Glumes lance-shaped, their keel smooth. Corolla cloven at the point, from which arises a short terminal awn.

Found in various parts of England.

12. MILIUM. Millet grass.

M. effusum. Spreading Millet grass.

Panicle loose and spreading. Leaves lance-shaped.

Ligule blunt.

Found occasionally in moist shady woods.

13. GASTRIDIDIUM. Nit grass.

**G. lendigerum* (formerly *Milium lendigerum*).

Awned Nit grass.

Awns twice the length of the lance-shaped glumes.

Found near the sea, where water has stagnated, in various parts of England.

DIVISION II.—*Calyx containing two or rarely three flowers.*

14. MELICA. Melic grass.

M. uniflora. Wood Melic grass.

Panicle branched, slightly drooping, spikelets erect.

Calyx containing only one perfect floret.

In damp, shady woods not uncommon.

**M. nutans*. Mountain Melic grass.

Panicle nearly simple, spikes drooping. Calyx containing two perfect florets.

Found in mountainous woods in England and Scotland.

15. MOLINIA. False Melic grass.

M. cœrulea (formerly *Melica cœrulea*). Purple Melic grass.

Panicle erect. Outer valve of the corolla three-ribbed.

Common on moory land. The fishermen of Orkney and Shetland construct nets with this wiry grass, and in England brooms are made of it.

**M. depauperata*. Tawny Melic grass.

Outer valve of the corolla five-ribbed.

Found only on the Clova mountains (Scotland).

16. AIRA. Hair grass.

A. cœspitosa. Turfy Hair grass.

Panicle diffuse. Awn arising from a little above the base of the floret, and scarcely extending beyond its jagged summit.

A coarse grass, forming tufts or hossacks in the borders of fields, woods, &c. A viviparous variety has been found on Snowdon.

A. flexuosa. Wavy Mountain Hair grass.

Panicle when in flower diffuse. Awn twisted, arising from a little above the base of the floret, and extending considerably beyond its summit.

Common in upland pastures, &c.

A. caryophyllæa. Silvery Hair grass.

Panicle spreading. Awn arising from a little above the middle of the corolla, and extending beyond it. Leaves bristle-shaped.

Common on dry stony or gravelly places, &c.

A. precox. Early Hair grass.

Panicle close and erect. Awn twisted, arising from a little above the base, and extending beyond the corolla. Leaves bristle-shaped.

Common on wall tops, &c., early in spring.

**A. canescens.* Grey Hair grass.

Panicle rather dense. Awn club-shaped, not longer than the calyx, the joint having a tuft of hairs.

Found on the sandy shores of Norfolk and Suffolk.

**A. alpina.* Smooth Alpine Hair grass.

Branches and flower-stalks perfectly smooth.

Awn arising from above the centre of the floret, and overtopping its jagged summit.

Found on the mountains of Scotland.

17. CATABROSA. Water Hair grass.

C. aquatica (Aira aquatica of some).

Leaves broad, continuing of the same width throughout their length, and terminating with a blunt point.

18. AIROCHLOE. Crested Hair grass.

A. cristata (Aira cristata of some).

Outer valve of the corolla three-ribbed. Stem downy.

Found in dry pastures.

19. HOLCUS. Soft grass.

H. lanatus. Meadow Soft grass, also called Yorkshire Fog.

Awn curved, its lower part smooth. Joints of the stem not hairy.

Common in meadows and pastures everywhere. An inferior grass, adapted, perhaps, to ill-reclaimed moorland.

H. mollis. Creeping Soft grass.

Awn rough throughout. Joints of the stem hairy.

Common in woods, &c.

20. ARRHENATHERUM. Tall Oat grass.

A. avenaceum (*Holcus avenaceus* of some, and *Avena elatior* of others).

Barren floret furnished with a prominent sharply-bent awn, the fertile floret scarcely awned.

A figure of the bulbous variety of this grass (Pearl grass), which some have considered a species, is given in the introduction; it is a troublesome weed in arable land. Both varieties are very common.

21. HIEROCHLOE. Holy grass.

**H. borealis* (*Holcus odoratus* of some). Northern Holy grass.

Florets awnless. Outer valve of the corolla fringed. Branches of the panicle smooth. Leaves flat.

Found in Angushire, in Scotland. In Prussia it is scattered at the entrance to places of worship; and in Sweden they suspend it over their beds, believing that it induces sleep.

22. SESLERIA. Moor grass.

S. cærulea. Blue Moor grass.

Panicle compact, of an oval shape. Outer valve of the corolla toothed at the summit, and awned.

Grows on the limestone mountains in the west of Ireland, also in England and Scotland.

23. PANICUM. Panic grass.

**P. verticillatum*. Whorled Panic grass.

Panicle spiked, cylindrical, lobed, having rough bristles, on which there are reversed teeth.

Found on the banks of the Thames, &c., in England.

**P. viride*. Green-flowered Panic grass.

Teeth of the bristles pointing upwards.

Found in Battersea fields, England.

**P. crus-galli*. Cocksfoot Panic grass.

Panicle erect, rough, one-sided, its lower branches rather distant, the upper ones crowded, all having tufts of fine smooth bristles.

Found with the last.

DIVISION III.—*Calyx containing three or (mostly) more flowers.*

24. DACTYLIS. Cocksfoot grass (also called Orchard grass).

D. glomeratus. Rough Cocksfoot grass. Fig. 1.

Panicle distantly branched; the flowers in dense tufts.

Calyx hairy. Outer valve of the corolla having a minute point a little beneath the summit.

This very common grass, which is said to have been introduced from America, but which, doubtless, is indigenous in this and most other countries in the north of Europe, is amongst the most valuable for both pasture and meadow.

A viviparous variety of this plant has been observed by Mr. Moore in the north of Ireland, and by Mr. W. Kelly at Portran, near Swords.

25. CYNOSURUS. Dogstail grass.

C. cristatus. Crested Dogstail grass. Fig. 9.

Panicle close, one-sided, of the same thickness throughout. Florets with a very short awn.

This very common grass is amongst the best for permanent pasture in medium land.

C. echinatus. Rough Dogstail grass.

Panicle dense, somewhat tufted and bristly with the long awns of the fertile spikelets.

Found occasionally in England, and recently by Mr. W. Wright, of Portarlinton, by whom it was communicated to us. *Vide* FARMERS' GAZETTE, July 27, 1844.

26. ARUNDO Reed.

A. Phragmites.

Florets longer than the calyx.

This coarse and common reed, in marshes and ditches, forms a very durable thatch. In Sweden they dye wool green with the panicle. The young shoots make a good pickle.

27. BRIZA. Quaking grass.

B. media. Common Quaking grass.

Spikelets broadly ovate. Ligule very short and blunt.

**B. minor.* Smaller Quaking grass.

Spikelets triangular. Ligule sharp and elongated.

28. TRIODIA. Heath grass.

T. decumbens.

Calyx smooth, containing four toothed florets.

Common on moory and mountain pastures.

29. POA. Meadow grass.

SECTION L.—*Spikelets linear; i. e., of nearly the same thickness throughout their length.*

P. aquatica (*Glyceria aquatica* of some). Water Poa. Panicle erect, very much branched. Spikelets approaching to an oval form. Florets not webbed. Outer valve of the corolla seven-ribbed.

Common in ditches, margins of pools, rivers, &c.; and producing an enormous quantity of herbage, which is greatly relished by cattle. (See Comparative Table.)

P. fluitans (*Glyceria fluitans* of some). Floating Poa, or Manna grass.

Spikelets linear. Outer valve of the corolla with short intermediate ribs at the base.

This grass, which may be seen in every ditch, is cultivated in Germany for its seeds—the manna seed of the shops, much esteemed for soups and gruel.

P. maritima. Creeping Sea Poa.

Spikelets linear, the branches and rachis smooth. Glumes three-ribbed. Outer valve of the corolla five-ribbed. Floret hairy at the base. Leaves rough on the inner

surface and rolled inwards. Root creeping; by which it is distinguished from the following.

Of frequent occurrence in salt marshes.

P. distans. Reflexed Poa.

Panicle spreading; at length bent downwards. Spikelets linear, consisting of about five blunt florets. Rachis and branches rough. Glumes three-ribbed. Outer valve of the corolla indistinctly five-ribbed. Floret not webbed. Upper sheath longer than its leaf.

Found on sandy ground near the sea.

**P. procumbens*. Procumbent Sea Poa.

Panicle compact, of an oval shape, and rigid. Floret not webbed. Glumes with three very prominent ribs. Floret with two small tufts of hair at its base; its outer valve five-ribbed—the middle rib extending beyond the summit. Rachis and branches rough to the touch. Upper sheath longer than its leaf. Ligule short and very blunt.

Found in salt marshes in England.

P. rigida. Hard Poa.

Panicle lance-shaped, two-rowed, close. Spikelets linear, of about seven florets, which are not webbed. Summit of the upper glume on a level with the base of the third floret. Glumes without lateral ribs.

Found on walls and rocks. Not uncommon.

P. compressa. Flattened Poa.

Panicle in some degree directed to one side. Florets webbed. Outer valve of the corolla of three or five inconspicuous ribs, the marginal ribs hairy, stem compressed.

Found on walls, dry ground, &c. Not uncommon.

**P. Borreri*. Borrer's Sea Poa.

Panicle spreading; its branches, when in fruit, having an upward direction. Florets not webbed. Outer valve of the corolla obscurely five-ribbed, and having a minute point.

Found in the south-east of England.

SECTION II.—*Spikelets ovate, or nearly so.*

P. pratensis. Smooth-stalked Meadow grass.

Panicle spreading. Florets webbed. Outer valve of

the corolla five-ribbed, the marginal ribs hairy, uppermost sheath much longer than its leaf. Ligule short. Stem and sheath smooth.

This is a very common grass in pastures, meadows, the tops of walls, &c.; but its creeping roots, in a great measure, unfit it for cultivation. Doctor Parnel says that the stem and sheath are sometimes rough, like the following, but the short ligule will always serve to distinguish it.

P. arida, *retroflexa*, *muralis*, and *arenaria*, of some botanists, are considered to be mere varieties of this.

P. trivialis. Rough-stalked Meadow grass.

Panicle spreading. Florets webbed. The outer valve of the corolla five-ribbed; the marginal ribs not hairy. Ligule long and pointed. Stem and sheath rough.

This excellent grass is very common, especially in deep rich moist land. *P. parviflora* is considered only a variety of this.

P. nemoralis. Wood Meadow grass.

Panicle, slender, leaning a little to one side. Florets webbed. Outer valve of the corolla five-ribbed; uppermost sheath smooth, and not longer than its leaf. Ligule short, and notched along its margin; stem compressed.

Common in woods, &c.; it thrives well under the shade of trees. Dr. Parnel makes *P. glauca* of Hooker, and also *P. angustifolia* varieties of *nemoralis*.

P. annua. Annual Poa.

Panicle spreading. Florets not webbed, five-ribbed; stem compressed. Ligule oblong and sharp-pointed.

P. alpina. Alpine Poa.

Panicle loosely-spreading, the spikelets broad. Florets hairy, but not webbed; the outer having three ribs. Glumes also three-ribbed. Upper leaf folded and shorter than its sheath. Rachis and branches rough. Ligule of the upper leaves oblong, sharp; of the lower leaves short and blunt.

Found in great abundance on the mountains of Scotland, also on those of England and Ireland.

**P. laxa*. Wavy Meadow grass.

Panicle loose and drooping. Florets webbed, their

outer valves, as well as the glumes, three-ribbed.

Upper leaf flat, and shorter than its sheath.

Found on the mountains of Scotland and the north of England.

The *P. polynoda* of Parnel seems scarcely different from this, and *P. Balfouri* of the same author will not, we fear, be considered a good species.

**P. bulbosa*. Bulbous Poa.

Panicle close, somewhat spiked. Florets webbed, their midribs downy. Leaves finely notched along their white narrow cartilaginous margin. Stems swollen at the base.

Found on sandy sea-shores in the east and south of England.

30. BROMUS. Brome grass.

B. mollis. Soft Brome grass.

Panicle close, of an oval form, erect when in seed.

Spikelets downy. Glumes and florets hairy; the larger glume seven-ribbed, the central rib not toothed. Awn straight, about as long as the glume.

This is a common and early grass, but an annual, and greatly inferior to Italian Rye-grass.

B. racemosus. Smooth Brome grass.

Panicle elongated, erect. Spikelets smooth. Larger glume seven-ribbed, the upper part of the centre rib toothed. Hooker considers it scarcely different from the last. Annual.

B. secalinus. Smooth Rye Brome grass.

Panicle loose, slightly drooping when in seed. Spikelets ovate, showing the rachis when in seed. Leaves hairy, the sheathes smooth. Large glumes seven-ribbed. *B. velutinus*, of some, is considered only a variety of this.

In corn fields not uncommon. Annual.

**B. arvensis*. Taper field Brome grass.

Panicle spreading, loose, slightly drooping, its lowermost branches much elongated. Spikelets lance-shaped. Glumes shorter than the awn, the larger glume seven ribbed.

Found near Southampton and Durham.

**B. squarrosus*. Corn Brome grass.

Panicle drooping, its branches simple. Florets nearly smooth. Awns extending outwards. Leaves downy. Found in corn fields in the south of England.

B. sterilis. Sterile Brome grass.

Panicle drooping, slightly branched. Large glume, three-ribbed. Awn longer than the corolla, the outer valve of which is seven-ribbed. Leaves downy.

Common on waste ground, by hedges, road-sides, &c.

**B. diandrus*. Upright Annual Brome grass.

Panicle erect, slightly branched. Large glume three-ribbed. Awn equal in length to the corolla. Leaves smoothish.

Found in the south of England, and near Kinross in Scotland.

B. erectus. Upright Perennial Brome grass.

Large glume three-ribbed. Awn about half the length of the corolla, the outer valve of which is indistinctly seven-ribbed, and one-third longer than the smaller glume. Root leaves narrow and fringed.

Common in the north of Dublin, and in various parts of the United Kingdom.

This, according to Hooker, is the only truly-perennial *Bromus*.

B. giganteus. Tall Brome grass.

Panicle branched, drooping to one side. Awn much longer than the florets. Leaves narrow, lance-shaped, and ribbed.

Grows in woods and hedges.

B. sylvaticus. (*Brachypodium* of some.)

Panicle drooping. Spikelets hairy. Awn longer than the florets. Leaves hairy.

**B. pinnatus*. (*Brachypodium* of some.)

Panicle close and erect. Awns shorter than the floret. Found on chalky soils in England.

**B. commutatus*. Tumid Field Brome grass.

Awns straight, about as long as the glumes. Leaves and their sheathes hairy.

**B. velutinus*. Downy Rye Brome grass.

Panicle scarcely branched. Florets downy. Awns as long as the glumes. Leaves slightly hairy.

This is the *Bromus multiflorus* of English botany. It and the three preceding appear to be mere varieties of one species.

B. asper. Hairy Wood Brome grass.

Panicle drooping. Florets hairy. Larger glume three-ribbed. Awn rather more than half the length of the corolla, the outer valve of which is five-ribbed. Leaves broad and hairy.

Not uncommon in woods and ditches.

**B. maximus.* Great Brome grass.

Panicle erect, loose, at length nodding. Awns two or three times as long as the glumes. Leaves downy on both sides.

Found on the sands of St. Aubin's bay, England.

31. AVENA. Oat and Oat-grass.

A. strigosa. Bristle-pointed Oat.

Panicle erect. Florets equal in length to the calyx, and terminating in two long straight bristles.

Common in corn fields.

A. fatua. Wild Oat.

Panicle erect. Spikelets drooping. Florets shorter than the calyx. Not bristled at the summit, but strongly awned.

The awn expands in moist and contracts in dry weather, thus forming a natural hygrometer.

Common in corn fields.

32. TRISETUM (*Avena* of some). Oat grass.

T. pratense. Narrow-leaved Oat grass.

Panicle erect, unbranched. Leaves short, smooth; their margins finely toothed; the lower ones rolled inwards. Sheathes not rough.

T. flavescens. Golden Oat grass.

Root leaves and sheathes hairy. Ligule very short and blunt.

A common grass, especially in upland pastures. Sheep are said to be particularly fond of it.

T. pubescens. Downy Oat grass.

Panicle erect; scarcely branched. Root leaves and sheathes hairy; their downy edges not toothed.

**T. alpinum.* Alpine Oat grass.

Panicle slightly branched. Florets longer than the calyx. Leaves broad and flat. Sheathes round and roughish.

Found on rocky mountains in Scotland.

**T. planiculme.* Flat-stemmed Oat grass.

Panicle erect, branched. Florets much longer than the calyx. Sheathes flattened, roughish. Leaves broad, but suddenly becoming pointed.

Found on the mountains of Scotland.

33. FESTUCA. Fescue grass.

F. duriuscula. Hard Fescue grass. Fig. 8.

Awn not as long as the corolla. Stem under the panicle smooth. Upper leaf smooth on the outer surface.

This is a common and excellent grass for sheep pasture.

The following are now considered mere varieties of this: *filiformis*, *arenaria*, and *rubra*. The two last, however, have creeping roots.

F. ovina. Sheep's Fescue grass.

Stem under the panicle rough; upper leaf rough on the outer surface.

In upland pastures, &c., Linnæus says that sheep have no relish for pastures of which this grass does not form a considerable part.

The following species of some botanists are considered only varieties of this, viz., *hirsuta*, *vivipara*, *angustifolia*, and *cœsia*. Indeed, in the opinion of the best living authority—Sir W. J. Hooker—*Ovina* only differs from *duriuscula* in the latter being the larger.

**F. uniglumis.* Single-glumed Sea Fescue grass.

Calyx having only a single glume.

Found on various parts of the coast of England.

F. bromoides. Barren Fescue grass.

Florets shorter than their awns. Stem leafless above.

Found on walls and in dry pastures.



F. myurus. Wall Fescue grass.

Panicle elongated and contracted. Florets shorter than the awn. Upper part of the stem leafy.

Found on walls and in barren places.

34. BUCETUM* (of Parnel, Festuca of others).

B. loliaceum. Spiked Bucetum. Fig. 11.

Panicle spiked. Spikelets linear oblong, remote, almost without foot-stalks. Outer valve of the corolla obtuse.

Occurs occasionally in moist meadows.

An excellent grass for deep and rather moist land.

B. elatius (Festuca elatior of some, Schedonorus of others). Tall Fescue grass, or Bucetum.

Panicle spreading, much branched, branches rough.

Found in moist meadows, ditches, &c.

B. pratense (Festuca pratensis of some, Schedonorus of others). Meadow Fescue, or Bucetum. Fig. 4.

Is considered merely a variety of the last.

Found in meadows, &c. Common.

SUB-DIVISION IV.—*Flowers in spikes, i.e., the solitary flowers, or spikelets sitting on a common stalk or rachis.*

35. TRITICUM. Wheat grass.

T. repens. Couch grass.

Root creeping. Rachis or common stalk rough. Stem smooth. Leaves smooth on the lower half of the outer surface.

A troublesome weed, as farmers are aware.

T. caninum. Bearded Wheat grass.

Root fibrous. Stem smooth. Awn longer than the corolla. Leaves not hairy on the inner surface.

Found in woods and hedges.

"This," Parnel says, "may be considered one of the most valuable of the early grasses, in a soil not retentive of moisture." On what authority we are at a loss to understand.

* The two or three British grasses of which Dr. Parnel has formed this new genus, ill consorted with those amongst which they were formerly placed. The most obvious distinction between it and Festuca consists in the broader root-leaves of Bucetum.

**T. cristatum*. Crested Wheat grass.

Spike short. Stem rough. Leaves hairy on the inner surface.

Found by Don, in Scotland, but now considered extinct.

T. junceum. Sea Wheat grass.

Florets not awned. Common stalk smooth. Root leaves rolled inwards, and sharp-pointed.

36. ELYMUS. Lime grass.

E. arenarius. Sea Lime grass.

Florets hairy, the lowermost not longer than the calyx.

Ligule very short, by which, as Parnel observes, and independent of other characters, this grass is at once distinguished from *Ammophila* (Sea-bent or Reed grass).

This rare grass, which, owing to the large quantity of sugar it contains, Sinclair calls the British Sugar Cane, was discovered many years ago by Mr. Drummond, Curator of the Cork Botanic Garden, and again by us on the Donegal coast, in 1827.—See

* Mackay's "*Flora Hibernica*," p. 314.

**E. geniculatus*. Pendulous Sea Lime grass.

Spike loose, bent downwards, with one bend. Glumes longer than the florets.

Found in a salt marsh near Gravesend. Very rare.

**E. Europæus*. Wood Lime grass.

Spike erect, completely smooth. Florets terminated by a long awn.

Not uncommon on chalky soils in England.

37. HORDEUM. Barley.

H. murinum. Wall Barley.

Glumes of the intermediate floret fringed; those of the side florets rough and bristly.

H. pratense. Meadow Barley.

All the glumes rough and bristly.

H. maritimum.

Glumes smoothish; all bristly except the interior one of the lateral florets, which is lance-shaped.

38. LOLIUM. Darnel and Rye-grass.

L. temulentum. Bearded Rye-grass.

Florets awned. Glume longer than the spikelet.

Annual. A noxious weed in corn fields, and the only British grass which possesses any deliterious quality.

L. perenne. Perennial Rye-grass. Fig. 5.

Flowers awnless, or only occasionally, and then not prominently awned. Glumes shorter than the spikelets.

L. tenue, *angustifolium*, *racemosum*, and *Italicum* (the Italian Rye-grass), are considered to be mere varieties of this valuable grass. Fig. 12.

**L. multiflorum*. Annual Many-flowered Rye-grass. Fig. 12.

Spikelets consisting of from ten to fourteen flowers, and extending much beyond the calyx. Upper florets with long awns.

Found in various parts of England.

39. *NARDUS STRICTA*. Common Mat grass.

Spike bristle-shaped, straight. Leaves much longer than their sheathes.

On moors, &c. Common.

*40. *ROTBOLLIA INCURVATA*. Sea Hard grass

Spike cylindrical. Calyx glumes combined below.

Found on salt marshes, &c. Annual.

*41. *SPARTINIA STRICTA*. Twin-spiked Cord grass.

Spikes two or three erect, with very smooth stalks. Glumes downy.

S. alterniflora. Spikes numerous. Flowers smooth. Southampton.

*42. *KNAPPIA AGROSTIDEA*. Early Knappia.

This little grass is found in a few places near the sea, in England.

*43. *CYNODON DACTYLON*. Creeping Dogstooth grass.

Spikes, four or five crowded together.

Found in Cornwall.

*44. *DIGITARIA SANGUINALIS*. Cocksfoot
Finger grass.

Leaves and sheathes somewhat hairy. Flowers in pairs. Found in sandy fields. Rare.

D. humifusa. Prostrate Finger grass. Rare.





COCKSFOOT GRASS. (*Dactylis glomerata*.)

1. Calyx, } magnified. 3. Flower natural size.
2. Corolla, }

PART II.

PROPERTIES AND COMPARATIVE VALUE OF THE MORE IMPORTANT AGRICULTURAL GRASSES.

SECTION I.—*Tall-growing Perennial Grasses of acknowledged utility, adapted for Pasture and Meadow.*

FIGURE I.

ROUGH COCKSFOOT GRASS. (*Dactylis glomerata*.)

THIS, if not the very best, certainly holds a very high rank amongst the superior agricultural grasses. It forms a portion of the herbage of every meadow, on dry, rich, well-sheltered land, as well as on ditch banks and under trees, where it may be at once recognised by its coarse rough stem, and tufted heads of flowers. Although undoubtedly an indigenous plant, its merits appear to have been first noticed in America, whence, on account of its great agricultural value, the seed is said to have been brought to these countries, some time about the middle of the last century. When this grass forms a very large proportion of the herbage, especially in rich land, it is by many considered too coarse for hay; indeed the property which it possesses, far above any other, of springing rapidly after being cropped, added to that of the young leaves containing more nutritive matter than the old, and that sheep are exceedingly fond of it, point it out as peculiarly adapted as pasture for that valuable animal; and as such it is most extensively and advantageously used in the sandy soils of Norfolk. To prevent its growing in tufts, which it is apt to do if sown in mixture with the finer grasses, it has been recommended to sow it at the rate of two bushels per statute acre, mixed with 10 lbs. of red clover.

By referring to the table of the comparative value of the grasses, at the end of this part, it will be seen that the crop of Cocksfoot, when the seed is ripe, contains a third more nutritive matter than it does when in blossom; notwithstanding which, the additional quantity of aftergrass obtained by cutting the crop when in flower, makes the advantage preponderate fully as much on the side of early cutting.

The following account of the extraordinary productiveness of this grass is given by Mr. Falla, nursery and seedsman, of Newcastle-upon-Tyne, in the *Quarterly Journal of Agriculture*.

On the 30th of April he weighed the produce of a square yard, and found it to be 16 lbs. or $34\frac{1}{2}$ tons per acre; the second crop of this yard was cut again on the 10th of June, and weighed 8 lbs. The third crop was cut on the 10th of September, and weighed 10 lbs. in all, equal to 73 tons as the year's produce! He remarks that it was, in every case, weighed on a dry day.

Cocksfoot blossoms about the last week in June, and ripens its seed in about three weeks afterwards. A bushel of good seed weighs about 12 lbs. The price per bushel in Dublin is 4s.

A tall-growing variety, under the name of *Dactylis giganteus* (Giant Cocksfoot), has been strongly recommended to notice; we have grown it alongside the common kind, but cannot perceive that it possesses any superiority.

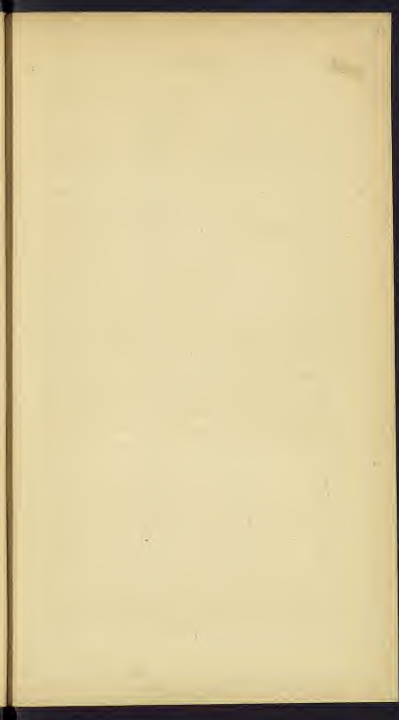


Fig. 2.



FOXTAIL GRASS. (*Alopecurus pratensis*.)

1. Calyx, } magnified. 3. Flower natural size
2. Corolla, }

FIGURE 2

FOXTAIL GRASS. (*Alopecurus pratensis*.)

This is a most valuable grass, whether for pasture or meadow. It is the earliest in blossom of the superior grasses, which circumstance, together with its soft oblong oval spike and awned flowers, at once distinguishes it from the Timothy, the only common grass with which it could be confounded. It occurs in deep, rich, moist, and sheltered land, in which we have seen it average a height of five feet, and produce an astonishing weight of the most excellent hay; but on upland, dry, or shallow ground its produce is very inconsiderable. It is well suited for irrigated lands, on which it produces an abundant coat of grass early in April, and in sheltered situations, and in a mild spring, even in March, a quality which renders it invaluable in sheep-breeding districts; for although flooded lands, if depastured by sheep in summer, are apt to rot them, the grass of the same meadows, in early spring has no such propensity.

Black cattle are said not to be very fond of this grass, but this we have never been able to perceive; on the contrary, they appear to us to relish it greatly.

A reference to the table of comparative produce will show, so far as the Woburn experiments go, the great inferiority of this grass to the Cocksfoot and also to the Timothy; but from what we know of it when growing in land suited to it, we are much inclined to doubt the results exhibited in the table; at all events, its earliness renders it an indispensable ingredient in any mixture intended for pasture in rich moist land.

The following instance of the value and permanency of this grass, even for undrained land, is taken from Mr. Taunton's excellent essay, published in the *Quarterly Journal of Agriculture*, in which he gives the result of experiments continued for many years, in order to ascertain the durability of the more valuable grasses. He says—"In the dry soil, in the course of seven or eight years, it became much weakened; but in a meadow, on the clay with a dark moory mould on the sur-

face, it maintained its size, and frequently as well or better than any other grass; and where I had sown it on deep loamy sand where springs rise, there its produce was extremely luxuriant, insomuch, that I this year sold the crop standing at the rate of £8 per acre. No manure had ever been given to this land since the grass seeds were sown seven years ago, other than the irregular irrigation produced by the winter springs; yet it most completely covered the ground. One character particularly attracted my attention, namely, that although it stood until late in the summer—not having been cut until late in July, and after the seed had fully ripened—none of the lower leaves had decayed or withered, whereas those of the Cocksfoot and Fescue and some others were quite dead. This experiment proves to what a valuable purpose any tract of springy, moist, loamy sand may be converted by sowing it down with a selection of grasses, in which the Foxtail should predominate.”

Foxtail grass blossoms in the end of May; a month after which its seed is ripe. The seed is much preyed upon by an insect which renders it very uncertain of growth. It weighs, when dry, about five and a half pounds, and is sold in Dublin at 6s. per bushel.

A dark-seeded variety, called *Alopecurus nigricans*, has been much extolled. We have it in cultivation with the common, to which we consider it much inferior.



Fig. 3.



CATSTAIL GRASS. (*Phleum pratense*.)

1. Calyx, } magnified. 3. Flower natural size.
2. Corolla, }

FIGURE 3.

CATSTAIL, or TIMOTHY GRASS. (*Phleum pratense*.)

Although undoubtedly, as we think, indigenous, this,—the Herd grass of America—like the Orchard grass (Cocksfoot), comes recommended to us from that country, whence, about the year 1780, the seed was brought for agricultural purposes. The name Timothy grass was given to it after Timothy Anson, by whom it was extensively cultivated in America.

It occurs commonly in deep, clayey, moist, and sheltered soils; and on such is by far the most productive and valuable grass with which we are acquainted. Its harsher, more cylindrical, and generally much longer head at once serve to distinguish it from the last; and should any doubt arise, the most cursory examination of the calyx glumes, and a comparison of them with the figure, will at once decide the point. Horses, and indeed cattle of all kinds, appear to prefer the hay of Timothy grass to all others, excepting, perhaps, that of the Italian Rye-grass.

Although preferring a rich, deep loamy or clayey soil, it grows with great luxuriance on one that is moory, provided it be deep, rich, and sheltered. By deep land we, in all cases, mean that which has been broken up to a depth of at least 16 inches, and this presupposes that draining has been effected, or, at least, that no stagnant water lies in the soil to that depth; for although this and the preceding, with some to be noticed hereafter, thrive in a soil comparatively moist, and are well adapted for irrigation, stagnant water is destructive to them, as it is to all the valuable grasses.

Timothy grass is often sown without mixture at the rate of 20 lbs. per Irish, or 12 lbs. per statute acre, to which the addition of a bushel of Italian Rye-grass in the former, and half that quantity in the latter, would be an improvement; for as the Timothy does not attain full perfection the first year, the Rye-grass would sup-

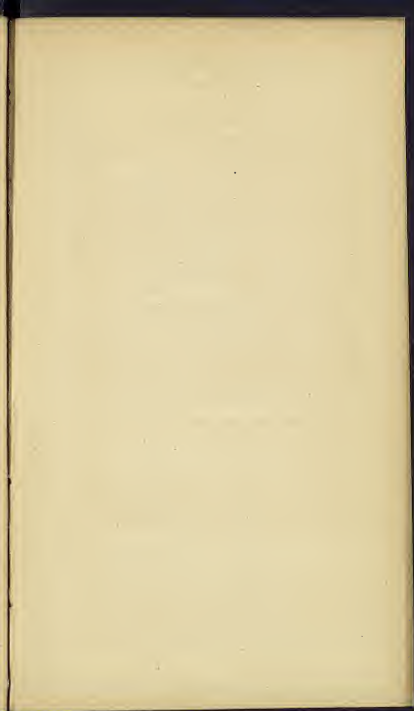
ply the deficiency, and its decay the second and third year, allow the other fully to occupy the ground.

A reference to the comparative table shows, so far as the Woburn experiments are concerned, the extraordinary productiveness and nutritive powers of this grass,* and suggests the propriety of laying down land suited to it, with it alone, without the admixture of other permanent kinds. It also possesses the excellent quality of producing its herbage early in the spring, in situations favourable to its growth; and although this is the case, it does not push up its flowering stems nearly so early as some others, thereby rendering the pasture longer available in spring, without serious detriment to the crop of hay than in cases where almost any other grass is used.

With respect to its permanency, Taunton says—“The *Phleum pratense*, which, on account of its cheapness as well as its valuable qualities, I had largely employed on all land which possessed any tolerable degree of fertility, has almost vanished both from the chalk and rich loamy sand, and has wholly disappeared from the poor calcareous heights; on the clay lands it is much diminished in size and height, but is still plentiful.”

Catstail flowers about the 1st of July, and ripens its seed about the 1st of August. A bushel of seed weighs about 44 lbs.; the price in Dublin is 20s. per bushel.

* In Sir Humphrey Davy's *Agricultural Chemistry*, fourth edition, page 380, it is stated, that the details (which are the same as those given in our table) show that one-half the nutritive value of the crop is lost by leaving it until the seed is ripe, whilst the very contrary is the fact; and this error has been copied into London's *Encyclopædia of Agriculture*.





MEADOW BUETUM, OR FESCUE. (*Bacetum pratense*.)

1. Calyx, } magnified.
2. Corolla, }

FIGURE 4.

MEADOW BUCETUM, or FESCUE. (*Bucetum pratense* of Parnel, *Festuca pratensis*; *Festuca elatior* var. *Scheinodora pratensis* of others.)

This grass, as appears by the above synonyms (not to advert to older ones in which it was considered a Poa), appears to have puzzled botanists a good deal in determining its characters.

We have cultivated it along with the two species most nearly allied to it, and with which, indeed, it is united by some botanists as varieties of one species, viz., *Festuca loliacea* and *Festuca elatior*; and notwithstanding the general resemblance which it bears to the last (it bears scarcely any to *F. loliacea*), still its much more upright panicle and smaller size serve at once to distinguish it; and although it may be difficult to point out specific characters which will satisfy a botanist, it appears fully as well entitled to rank as a species as very many which they have so dignified. Be this as it may, however, one thing is certain, that it is a very excellent grass, adapted to every variety of soil—provided only that it possess the requisites without which none of the superior grasses will succeed, viz., depth, a certain degree of dryness, shelter, and richness. On such a soil, and in mixture with the preceding kinds, viz., Cocksfoot and Foxtail, say of each a bushel, and 10 lbs. of Timothy per Irish acre, it will produce a most valuable meadow and pasture.

Unlike the Catstail grass, as will appear by a reference to the comparative table, it contains twice the quantity of nutritive matter per acre, if cut when in blossom, that it does if allowed to stand until the seed is ripe. The weight of grass is greater at the latter period, but its proportional value, as regards nutritive matter, is then as 6 to 18, or only one-third as valuable. This grass flowers towards the middle of June, and ripens its seed in July; it weighs about 13 lbs., and is sold in Dublin at 9s. per bushel.

FIGURE 5.

PERENNIAL RYE-GRASS. (*Lolium perenne*.)

This grass has long been cultivated, both in this country* and in England and Scotland, until within a short period, to the exclusion, if we except Timothy grass, of almost every other of the "true grasses." This has been caused not even from a belief of its superiority to other and more permanent kinds, so much as from the facility with which the seed can be procured, and the certainty of its growing on almost any kind of land which has been fairly prepared for it.

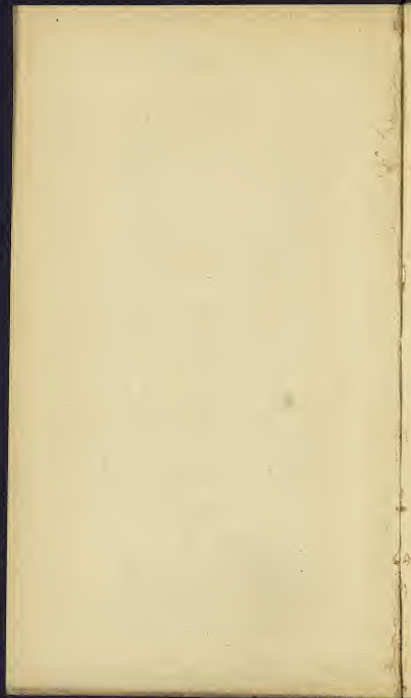
Of the Perennial Rye-grasses, as they are called, although in reality the most permanent of them does not deserve that title, there are numerous varieties, each originally recommended as being superior to all others; amongst these Pacy's, Stickney's, and Russel's, have long obtained, we believe, a deserved preference. On the subject of the permanency of "Perennial" Rye-grass Mr. Taunton, says:—"One of the most prominent facts which struck me in my chalky soil was, the utter disappearance of every variety of Rye-grass, of which I had sown several loudly-praised as true perennials, not only in beds, but more extensively in my field-culture. I also observed the same in my deepest and richest loamy soils." It is right to state that he goes on to say, "I do not, however, feel myself warranted to infer, that there is no species of Rye-grass which is perennial in certain soils. On the contrary, my observation of some particular meadows and pastures in different parts of the kingdom,

* Mr. Lawson, in his excellent Treatise on the Cultivated Grasses, states, (page 13,) that Rye-grass was still uncultivated in Ireland at the commencement of the present century. In this he is mistaken, as will be seen by a reference to White's Essay on the Indigenous Grasses of Ireland, published in 1808, in which at page 114, he says, "I recollect that about thirty years ago whole fields of this grass were cultivated at Rathesker, the seat of the Right Hon. John Foster, and that it was esteemed by the oldest farmers to be the most valuable of all the grasses."

Fig. 5



PERENNIAL RYE-GRASS. (*Lolium perenne*.)



induces me to believe, that some varieties of *Lolium* are in some soils indigenous and perennial; but the experience I have above detailed warrants me in dissuading from that profuse and promiscuous use of Rye-grasses, called perennial, which their cheapness and certainty of growing have too much recommended in ordinary practice, unless, by a previous experiment of several years, it shall have been ascertained that the particular variety employed will prove permanent on that particular soil, which it is desired to convert to grass:" and he most properly concludes—"The sowing of any annual, biennial, or triennial grass on land which has been carefully cleaned, pulverized, and manured for the purpose of converting into meadow, is an act of short-sighted and ruinous economy, and of the worst possible husbandry."

Our own experience, acquired in laying down some hundreds of acres with this grass alone, or in mixture with others, fully bears out the justice of the above remarks, and caution against the indiscriminate use of Rye-grass for laying down lands to permanent pasture: nor is want of durability its only bad property; it is perhaps the most exhausting of all grasses on land, nearly as much so indeed when permitted to form its seed, which it almost always is, as a crop of corn; and in dry soil, or in almost any kind of soil, should dry weather set in after it has been cut, an almost total failure of the aftergrass will be the result. Its greatest value appears to be for sowing with clover, on land intended to remain only two or three years in grass; with this view, and when sown at the rate of one bushel per Irish acre, with 20 lbs. of Red Clover, or two bushels of Rye-grass, and a stone of Red Clover on deep rich ground, enormous crops are produced. When the intention is to leave the land only one year in grass, the Italian Rye-grass is greatly to be preferred.

A reference to the comparative table will show, so far at least as the Woburn experiments are concerned, the great inferiority of the Perennial Rye-grass to all those which precede it in the table, and to many which follow it, both as regards quantity and quality of the produce; it also appears that the grass is equally nutritive when

in flower, and at the time the seed is ripe; as regards weight of aftergrass and the nutriment it contains, it is the very lowest in the scale of cultivated grasses. Thus, it appears, that its produce and nutritive power, compared with Cocksfoot grass, are inferior, nearly in the proportion of five to eighteen; to the Meadow Foxtail as five to twelve; and to Meadow Fescue, as five to seventeen. This inferiority is proved by the following experiment, as detailed by Mr. P. Sheriff, in the second volume of the *Quarterly Journal of Agriculture*. He sowed, on the 14th of April, a heavy loam incumbent on a retentive subsoil—14 Scotch, equal to $17\frac{1}{2}$ statute acres—with the following mixture, viz., 140 lbs. Red Clover; 65 lbs. White; 28 lbs. Yellow (*Medicago lupulina*); $2\frac{1}{2}$ bushels Rye-grass; 8 bushels Cocksfoot; 4 bushels Hard Fescue; 85 lbs. Catstail: and, at the same time, 10 lbs. of Red Clover, 5 lbs. of white, 2 lbs. of Yellow, and 2 bushels of Rye-grass, were sown on one Scotch acre near the centre of the field; the result was, that the hay, which was cut on the 29th of June, produced at the rate of 320 stone of 22 lbs. each per acre, of the Clover and Rye-grass, worth $5\frac{1}{2}$ d. per stone; and aftergrass, 120 stones, worth $4\frac{1}{2}$ d. per stone; altogether worth £9 1 ls. 8d.: and from mixed seeds 340 stones, worth 6d. per stone, and second crop, 160 stones, worth 5d. per stone, £11 16s. 8d.; the mixed seeds cost 15s. 6d. per acre more than the Rye-grass and Clover.

Perennial Rye-grass weighs from 24 to 30 lbs.; and the price in Dublin is, according to the kind, from 3s. to 6s. per bushel.

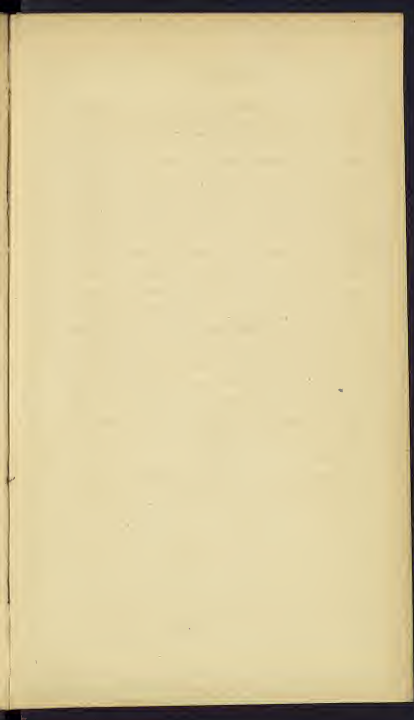


Fig. 6.



ROUGH-STALKED MEADOW GRASS. (*Poa trivialis*.)

1. Calyx, } magnified.
2. Corolla, }

FIGURE 6.

ROUGH-STALKED MEADOW GRASS. (*Poa trivialis*.)

A reference to the specific character of this grass will show how nearly it approaches in appearance to the smooth-stalked Meadow grass, which, however, has creeping roots, thereby rendering it, in a great measure, unfitted for cultivation; other marks of difference by which it may at all times be easily recognised, are the roughness of the upper leaf sheath, and the prolonged stipula by which it is terminated; that of the smooth-stalked *Poa* being very short, and the sheath smooth.

The rough-stalked Meadow grass may be found in rich, deep, rather moist, and well-sheltered meadows, and in ditches every where: in such land its produce is very great, and its hay is relished by cattle; but on land of a contrary nature—on that which is shallow, dry, and exposed—it is of no value; it is also well suited to irrigation, as appears from the instances we have mentioned below. From all this, it is evident that the Rough-stalked Meadow grass should form a portion of any mixture intended for permanently laying down land of a character such as we have indicated above; this mixture might be the same as that given under No. 4, substituting half a bushel of this for half a bushel of Cocksfoot.

This is the famous Orcheston grass, of the extraordinary growth and productiveness of which so much has been said. The famous Orcheston meadow, near Salisbury, is so situated in a valley, as to be irrigated in time of great rains; and the rich particles of soil and manure brought down by the floods, and deposited on the meadow, have produced a growth in this grass of upwards of twenty feet in length in a single season; by far the greatest portion of the length, however, it appears is generally covered with the deposit, only a portion of the upper part being available; still it has yielded, on an average, five tons of hay per statute acre. It also forms a large portion of those wonderful meadows in the vicinity of Edinburgh, which, being

irrigated by the sewers of the city, are cut four or five times in a season, producing an incredible weight of herbage and of hay; and powerfully demonstrating the loss which is annually sustained by neglecting to turn the sewers of our towns and cities to account. We send to our Antipodes for the very manure which, to an almost unlimited extent, we suffer to pollute our rivers, rendering their waters unwholesome, and to be by them deposited in the depths of the ocean.

In the comparative table this grass does not rank high either as to quantity of produce or quality; but this depends so much on the soil and that of the experimental garden being too dry, that it scarcely affords any criterion as to its real merits when cultivated on suitable land: by this table it appears that the produce in grass at the time of flowering, and when the seed is ripe, is about the same; but that the proportional value of the ripe to the flowering crop, is as eleven to eight; still, taking the deterioration of the land during the ripening of the crop and the loss of aftergrass, into account, we are strongly of opinion that the advantage, not only as regards this but all other grasses, will be found in favour of early cutting.

The following observations of Mr. Sinclair will show that his estimate of this grass was not formed on the result of his experiments in the grass garden. He says: "The superior produce of this grass, its highly nutritive qualities, the seasons at which it arrives at perfection, and the marked partiality which oxen, horses, and sheep have for it, are merits which distinguish it as one of the most valuable, which affect moist rich soils and sheltered situations."—*Hort. Gram. Wob.* p. 148.

It flowers about the middle of June; the seed weighs about 15 lbs., and the price in Dublin is about 14s. per bushel.

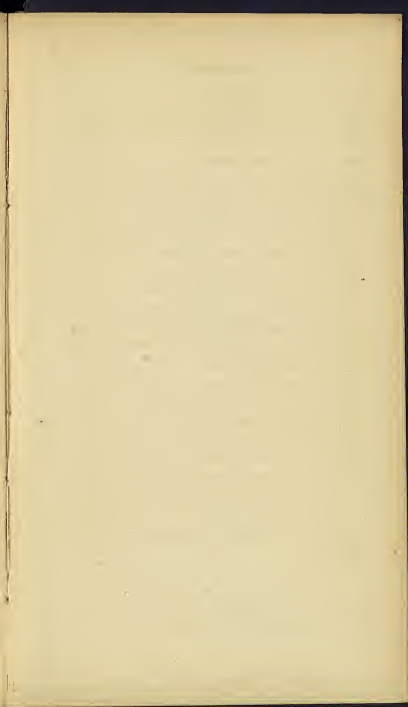


Fig. 7.



FIORIN GRASS. (*Agrostis alba.*)

1. Calyx, } magnified. 3. Flower natural size.
2. Corolla, }

FIGURE 7.

FIORIN GRASS. *Agrostis alba*. (*A. stolonifera* of some.)

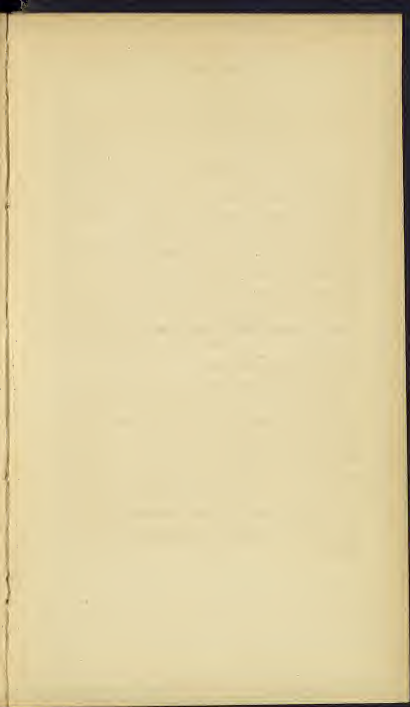
This grass appears to have been first brought under public notice, as one peculiarly suited for moist land, and for irrigation, by Stillingfleet, towards the end of the last century; and this recommendation was revived, and the valuable properties of the plant powerfully insisted on, by the Rev. Dr. Richardson, of Clonfeacle, towards the commencement of the present century. The essays written by the doctor, and papers in the various agricultural publications, &c., would, if collected, form a large volume. His advocacy induced innumerable trials, the great majority of which, being conducted by persons ignorant of the nature of the grass, on land unsuited to it, and with the wrong kind of grass, brought discredit on his statements; and fiorin became despised to the same extent that the doctor would have it preferred: those, however, who, knowing its natural habits, provided for it a deep moory soil, or one where it could be irrigated, have found that none of Doctor Richardson's statements, either with respect to its astonishing productiveness in hay, or its adaptation for being cut for green soiling for cows and even horses both in summer and in winter, were exaggerated; and it is, therefore, with much surprise we find an agricultural writer of great authority on the other side the Channel, characterizing it in a recent agricultural periodical, as a vile weed; no doubt, under some circumstances it is so, but his condemnation, the result we cannot but say of great ignorance on a subject in which he ought to have been better informed, is absolute.

The seed of Fiorin grass is not easily procured. When sown, it is so exceedingly minute (half a million, it is said, being contained in an ounce weight), that it should be sown on the surface, and merely rolled in; the usual way of propagating it, however, is, by strewing in moist weather, in spring or autumn, the stolons (jointed stems), previously cut into lengths of a few inches, on the surface of the land; these being covered

with a little earth, immediately take root, and in a few months fully stock the ground. The land usually devoted to this grass is reclaimed moor, often that from which turf (peat) has been cut for fuel; this should have the stagnant water removed from it by draining to the depth of at least thirty inches; it should then be deeply digged, and the bog stuff of the surface thereby mixed with the clay, earth, or till of the subsoil; should these be at too great depth, the surface, after being delved, should be covered with earth or clay to the depth, if possible, of at least two inches.

For the crop of hay, as it stood on land so treated, and which previously was not worth 10s. per acre, we have received in the third year after it was laid down from £5 to £8 per Irish acre; a crop, or at most two, being sufficient to reimburse the outlay consequent on the reclamation. How many thousands of acres are there in this country, equally capable of making a profitable return for the labour bestowed on them, permitted to continue waste, and the streams, by which they might be rendered mines of wealth, suffered to flow unheeded to the ocean.

In the sixth volume of the *Transactions of the Highland Society* is published a report by the Rev. J. Stewart, and R. Downe, Esq., J. P., to the effect that Mr. D. M'Coll trenched a piece of marsh land, strewed the stolons of Fiorin on the surface, over which he spread a compost of lime and earth; the produce in the second year was 2,325 stone, 23 lbs. each, of hay on three statute acres (upwards of seven ton per acre), and the land was thereby raised in value from 10s. to £10 per acre! and in the fifth volume of the same work Dr. Hamilton details a similar improvement, the whole expense of which, £8 per acre, was reimbursed by the first crop of hay. Numerous similar results might be quoted.





HARD FESCUE GRASS. (*Festuca duriuscula*.)

1. Calyx, } magnified.
2. Corolla, }

SECTION II.—*Comparatively low-growing perennial grasses, adapted for sheep pasture in light or upland ground.*

FIGURE 8.

HARD FESCUE. (*Festuca duriuscula.*)

This is an excellent grass for medium, or even for good land, especially when intended as a sheep pasture. It is easily distinguished from the Meadow Fescue by its narrow bristle-like leaves, but there are no characters by which it can be distinguished from the Sheep's Fescue except by its taller and more robust mode of growth; from the Red Fescue (*F. rubra*), which is considered merely one of its numerous varieties, it may be known by the latter having creeping roots, whereas the Hard Fescue has fibrous roots.

Three or four varieties of the Hard Fescue have been recommended for cultivation as superior to the common: we have cultivated two of them, (*F. purpurata* and *F. præcox*), which, we believe, are amongst the best, and consider them by no means superior.

This grass should form a considerable portion of any mixture for laying down medium or light or upland ground permanently for sheep pasture; for this purpose, a bushel of the Hard Fescue, half a bushel of Crested Dogstail, one bushel Yellow Oat grass, one bushel of Sweet Vernal grass, and half a bushel of Sheep's Fescue, could hardly fail to form a most excellent pasture.

The Hard Fescue grass blossoms in June and July, and ripens its seed three weeks or a month after. A bushel of seed weighs about 10 lbs.; and the price in Dublin is 10s. per bushel, or 1s. per lb.

FIGURE 9.

CRESTED DOGSTAIL GRASS. (*Cynosurus cristatus*.)

This, which is known to every Irish farmer as the Trahneen or windle-straw, is common in all except the very richest pastures, in which it is overpowered by the more robust-growing kinds. For pastures on medium soils, and in upland but not greatly-elevated situations, this is a most valuable grass. Sheep, deer, in fact, all herbivorous animals are particularly fond of it; and its perpetually-verdant foliage renders it the very best grass that can be used for laying down pleasure-grounds. The flowering stems being wiry, are left untouched during summer by grazing animals; and this is found to be advantageous in upland sheep districts, where the old stems and heads, standing above the snow when not more than a foot or so in depth, are eagerly sought after by the sheep.

Crested Dogstail grass, as will be seen by a reference to the comparative table, holds a low place both as regards weight of produce and nutritive matter; notwithstanding which, being so much relished by sheep, it should form a considerable portion of every mixture intended principally for that animal, and even for cattle in medium upland soils.

The stems of this grass are amongst the most valuable of those used in the manufacture of imitation Leghorn bonnets.

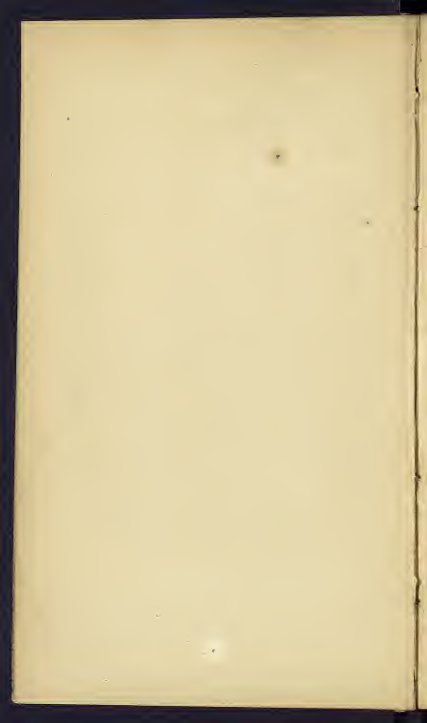
Dogstail grass flowers about the middle of June; about three weeks after which its seeds are ripe. The seed weighs about 26 lbs.; and the price in Dublin is about 16s. per bushel.

Fig. 8



CRESTED DOGSTAIL GRASS. (*Cynosurus cristatus*.)

1. Calyx, } magnified. 3. Barren spikelet.
2. Corolla, }



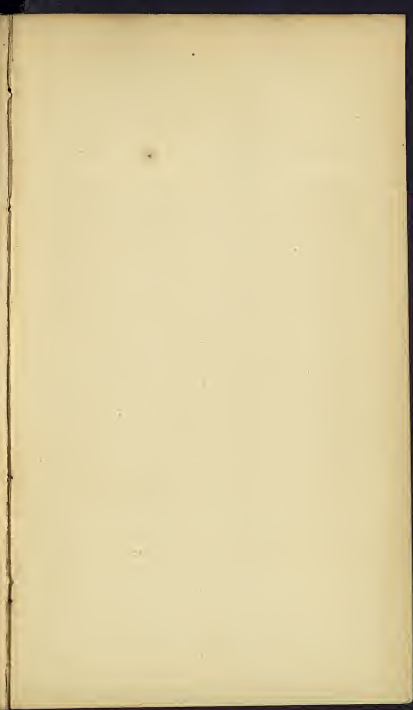


Fig. 10.



SWEET VERNAL GRASS. (*Anthoxanthum odoratum*.)

1. Calyx, } magnified. 3. Flower natural size.
2. Corolla, }

FIGURE 10.

SWEET VERNAL GRASS. (*Anthoxanthum odoratum*.)

This is the only cultivated or "true grass" which has but two stamens, and consequently belongs to the second of the Linnæan classes—all others having three stamens. It is also the earliest of the cultivated grasses, and is common in rather poor upland pastures, whether moist or dry; also in thickets, and under trees.

Sweet-scented Vernal grass is amongst the least productive of the cultivated grasses; yet earliness is so valuable a quality in sheep pastures, that no land should be laid down for that purpose without it.

The delicious fragrance of newly-mown hay is said to be, in a great measure, given to it by this grass. Curtis says, "It is well known to be the only British grass which is odoriferous. The agreeable scent of new hay arises entirely from this grass: the green leaves when bruised readily impart this perfume to the fingers, by which means the foliage may at all times be known." He might have added, that on chewing a bit of the stem the flavour of that sweet little plant woodruff, (*Asperula odorata*) is very perceptible; but, although its presence greatly increases this fragrance, hay is sweet-scented where not a blade of the Vernal grass is to be seen. It blossoms early in May, and ripens its seed in June. The seed weighs about 6 lbs., and is sold in Dublin at about 8s. per bushel.

No. 11.

YELLOW OAT GRASS. (*Trisetum flavescens*,
Avena flavescens of some.)

This grass is common in almost every description of soil, and in all situations; where its slender stems and leaves, elegantly-branched and finely-awned panicle of a yellowish hue, readily distinguish it from every other grass.

Although occurring most commonly in upland dry light ground, it sometimes forms the principal herbage in deep, rich, and even moist land; in which case, owing to its slender mode of growth, it is very liable to "lodge."

Its want of productiveness, however, compared with other grasses, renders it unworthy of a place in the richest land; its proper place appears to be in mixture with those of the section in which we have placed it, as pasturage for sheep in land of medium quality.

Mr. Taunton would not, however, restrain its use within limits so narrow as we have assigned to it. "Yellow Oat grass," he observes, "is so rich in its qualities, and so universal a citizen of the world, that there is no soil—from the lightest calcareous loam to the stiffest clay—into which I would not introduce it, where I wanted to produce a permanent turf." We may add, that it forms, with Crested Dogtail grass, Sweet Vernal grass, and Wood Poa, an excellent mixture for laying down pleasure-grounds intended to be kept in short grass.

It flowers in the beginning of July, and perfects its seed early in August. The seed weighs about 5 lbs.; and the price in Dublin is about 9s. per bushel.

No. 12.

SHEEP'S FESCUE. (*Festuca ovina*.)

This is the most diminutive and least productive of all the cultivated grasses. It is only to be distinguished from the Hard Fescue grass, (Fig. 8,) to which it is much inferior in all respects, by its humbler mode of growth. It occurs in light land, and in upland and elevated pastures, wall tops, &c., everywhere.

This grass, of which sheep are exceeding fond, maintains a deep verdure long after every other (with the exception of its near relative the Hard Fescue grass) has been withered up by the summer's sun. Linnæus says that sheep are never known to thrive on mountain ground of which this grass does not form a principal part of the herbage, which, by the way, it does on all our mountains where any grass will grow.

The fineness of its bristle-shaped leaves, which form a close verdant carpet, has caused it to be much recommended for laying down pleasure-grounds intended to be kept mown; but this fineness and hardness of the foliage, especially in dry weather, causes it to yield to the scythe, and it is then, with the greatest difficulty, it can be cut: we would, therefore, much prefer for this purpose the Crested Dogstail grass alone, or in mixture with the Wood Poa, Yellow Oat grass, and the Sweet Vernal grass.

Notwithstanding the deficiency of produce in the Sheep's Fescue, we have no doubt of the propriety of adding it to the other grasses of this section, when the intention is to lay down elevated or light land permanently as pasture for sheep.

It is in flower towards the end of June, and ripens its seed in July. It weighs about 13 lbs., and is sold in Dublin at about 18s. per bushel.

SECTION III.—*Tall-growing perennial grasses, adapted probably like those of Section I., for both pasture and hay; but, concerning which further information is required.*

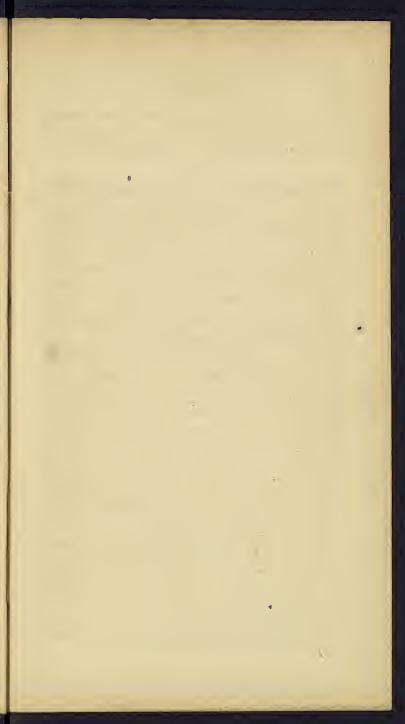
No. 13.

TALL BUCETUM. (*Bucetum elatius* of Parnel, *Festuca elatior* of others.)

This strong tall-growing grass is found in meadows, ditches, along the margins of streams, &c., in strong moist land. It bears a strong resemblance to *B. pratense*, Fig. 4; but may be distinguished from it by its drooping panicle and more robust mode of growth.

The results of the Woburn experiments, as appears by the comparative table, place this amongst the very best of the grasses—the very best, indeed, as regards the quantity of nutritive matter which it contains per acre, and nearly so as to productiveness. It has been called the Infertile Fescue, from not usually ripening its seed; and Curtis, in his work on grasses, suggests that the best mode of propagating it is, to transplant it on properly-prepared land. In doing so, we have separated a large plant into more than a score pieces, which, being planted at six inches apart every way, completely stocked the ground in less than a year from the time of planting; and these plants produce abundance of fertile seed, proving that the term infertile is wrongly applied to it. Thinking it possible, however, that we might, in our experiment, have met with the fertile variety—for such has been discovered, and highly extolled—we have been at the pains to examine it in a great variety of situations, and have almost invariably found it fertile when growing in situations open to the sun.

With respect to its permanency, Mr. Taunton says:—“It delights me to see that the fertile-seeded, tall Fescue preserves its superiority as well in the light soil as in the strong clay. It is, in both, the largest and most vigorous plant which I possess. In a small meadow—in a loamy clay, which has not been manured for these nine years, but in which this noble grass is a principal component part—I still cut two tons of hay to the acre.”





SPIKED BUCETUM, or FESCUE. (*Bucetum Liliaceae*)

1. Calyx, } magnified.
2. Corolla, }

No. 14.

SPIKED BUCETUM. (*Bucetum loliaceum* of Parnel,
Festuca loliacea of others.) Fig. 11.

This grass, as its name indicates, bears a strong resemblance to the Rye-grass (Fig. 5), but may at once be distinguished by the two glumes of its calyx, whereas that of the *Lolium* has but one. Like the last, it is found but much more sparingly on moist deep ground. It is not by any means of such robust growth, even in the best land, as the Tall Bucetum, yet it produces an immense quantity of herbage, of which cattle are very fond. The Woburn experiments, as shown by the table, indicate this grass as greatly superior to the perennial Rye-grass, both for hay and pasture. Sinclair says that it improves in produce in proportion to its age, which is directly the reverse with respect to Rye-grass. Like the last, although growing naturally on moist land, we find that it thrives well on dry land, which has been well drained, provided it be deep. It appears to be an excellent grass for irrigated land; and on the whole, as Mr. Taunton observes, "is much better deserving of trial than many which have been pompously recommended."

Specimens of this grass are occasionally found in which the lower spikelets are branched, in which case it bears a distant resemblance to *Bucetum pratense*, (Fig. 4,) with which some botanists have confounded it; but if not a good species, it certainly is a very marked variety; the leaves, too, are broader, and of a dark green hue; it seldom or never ripens its seeds.

No. 15.

TALL OAT GRASS. (*Arrhenatherum avenaceum*.)

(A figure of this grass is given in the introduction.)

There are two varieties of this grass—the one with bulbs or tubers in connection with the base of the stem; the other without this appendage, and having only fibres: the latter has been loudly extolled as being excellent for both hay and pasture; but this we are much inclined to doubt, and only give it a place here in order to induce further experiments to determine its merits. In good ground, whether moist or dry, it certainly produces a considerable weight of herbage, but it loses much in drying; and the Woburn experiments show that it contains comparatively little nutritive matter. It is said to contain more bitter principle than any other grass; nor do cattle appear to relish it much.

No. 16.

REED POA. (*Poa Calamaria* of Parnel, *Festuca Calamaria* of others.)

The culms or stems of the plant attain a height of two or three feet or more, and are leafy; the leaves a deep green. It is found in woods, especially in mountainous districts. Of its utility, in an agricultural point of view, we know nothing beyond what may be collected from Mr. Sinclair's experiments, from which it would appear to be the most productive and the most nutritious grass in cultivation, yielding, in fact, a greater weight of nutritive matter than many of the other esteemed grasses do of hay. We have, therefore, noticed it here, in order to attract attention to its alleged merits. It is said to be also an early grass.

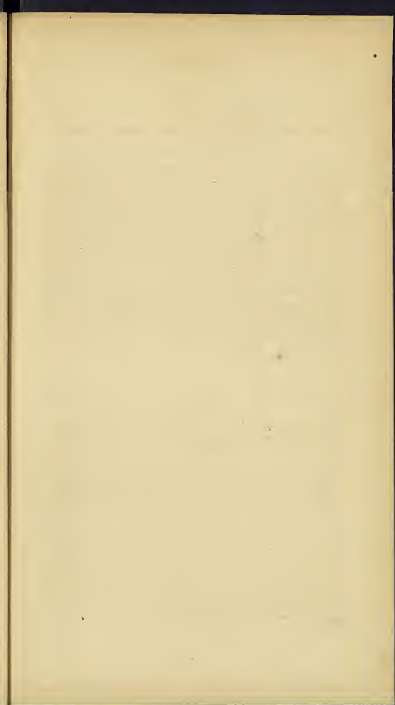


Fig. 12.



ITALIAN RYE-GRASS. (*Lolium Italicum.*)

SECTION 4.—*Containing a few Grasses useful for Particular Purposes.*

No. 17.

ITALIAN RYE-GRASS. (*Lolium, perenne* var. *Italicum*.) Fig. 12.

This, were our arrangement founded on the comparative value of the cultivated grasses, would in all probability have occupied the foremost place, to which its extraordinary productiveness in land adapted to it, its suitableness for soiling, and its agreeableness to horses and cattle, whether green or in hay, give it no inconsiderable claim. The Italian Rye-grass is probably a mere variety of the Perennial, which we have frequently found awned, and in appearance intermediate between the ordinary Perennial and Italian; and this supposition has received further corroboration by the discovery of an almost awnless and dark-coloured spreading variety, which is said to be still more valuable than that hitherto cultivated;* be this as it may, its introduction to this country, as a cultivated grass,—for which we are indebted to Mr. Lawson, the eminent Edinburgh seedsman, whose efforts to diffuse information on the subject of the Agricultural Grasses have rendered him second only to Sinclair,—is a boon for which the agriculturists of the United Kingdom may well be grateful. This noble grass requires a deep rich dry soil, and sheltered situation; on such it may be cut for soiling three or four times in a season, yielding at each cutting a large quantity of highly-relished green food. It is only adapted for the alternate husbandry, and for one, or at most two years' grass; if left for a longer period in the ground, the produce is inconsiderable, and at the end of the fourth or fifth year it will have altogether disappeared. It may be sown with oats or barley in spring, in which case, should the ground be good and the situation sheltered, it will

* See Mr. J. Rodwell's paper in the Journal of the English Agricultural Society for August, 1844.

have attained nearly the hight of the corn by harvest, rendering the straw of oats, with which it is thus mixed, fully equal as food to ordinary hay.

With this view, Mr. Skilling, the intelligent agriculturist of the National Board of Education's Model Farm, near Dublin, who has had great experience in the cultivation of this grass, sows at least three bushels per Irish acre, mixed with eight or ten pounds of red clover; and he finds that, by the time the corn is ripe, a large quantity of the seed of the grass has shed, from which arises a growth of young plants, adding greatly to the produce the following year. On nine acres Irish of land so laid down, Mr. Skilling informs us he has house-fed sixteen cows, a couple of horses, and four or five young cattle, and saved three tons of hay per acre. The rapidity of the growth of this grass, under favourable circumstances, is astonishing: we have known a field sown with it in the Model Farm, in the middle of October, to be cut for soiling in December, and to be ready for cutting again in April, being then two feet high; and a gentleman who resides in the county Donegal, and whose reply to our inquiries on this subject we have published elsewhere, says—"I have just now (18th of September) secured the second crop of hay from Italian Rye-grass seed, purchased in Dublin on the 14th of June." But it is only in good land, and under good management, that this grass becomes so valuable. We have tried it in thin land, which was sufficiently rich to ensure a good crop of Perennial Rye-grass, but on which the Italian was hardly worth the expense of cutting and saving; and an experience of it enables us to state, that it is altogether useless to attempt to cultivate it on light poor land, or in exposed situations. It has been recommended, and we think with great propriety, to be mixed with the seeds of the Perennial grasses which do not attain full maturity the first year; such, for instance, are the Foxtail, Timothy, and Cocksfoot grass. Eight to twelve pounds of the Italian Rye-grass added to a sufficient quantity of these seeds, secures a crop the first year, and as it decays room is given to the others to extend. It weighs about 15 lbs., and is sold in Dublin at about 7s. per bushel.

No. 18.

YORKSHIRE FOG, SOFT GRASS or WHITE GRASS. (*Holcus lanatus*.)

This grass, owing to the facility of procuring a great bulk of the seed, and its cheapness, as well as being the chief ingredient in the sweepings of the hay-loft, is much more extensively sown in this country than any other kind, not excepting the Perennial Rye-grass; notwithstanding which, and the favourable results both as regards weight of produce and of nutritive matter, as exhibited by the Woburn experiments, we look upon it as a most inferior grass—one on which it is a pity to throw away good ground—and adapted only to produce a kind of herbage superior indeed to rushes and sedges on ill-reclaimed and ill-managed moor land.

The soft grass flowers about the end of June, and ripens its seed in July. The seed weighs about 7 lbs., and is sold in Dublin at 1s. per bushel.

No. 19. CREEPING SOFT GRASS. (*Holcus mollis*.)

We have introduced this grass merely on account of the results arrived at in the Woburn experiments, as exhibited in the comparative table, notwithstanding which, we consider it a worthless weed; and this leads us to observe, that however useful this table may be, as affording at a glance the result of the Woburn trials, these results must be received by the practical farmer with great caution.

No. 20. WATER POA. (*Poa aquatica*.)

In clay land, wholly, or for a considerable portion of the year, under water, this grass, which is found growing naturally on the margins of canals, rivers, &c., certainly produces an enormous weight of herbage, which, either green or in hay, is much relished by cattle.

No. 21. SMOOTH-STALKED MEADOW GRASS.
(*Poa pratensis*.)

The smooth stalk, short ligule, and creeping roots of this grass sufficiently distinguish it from the Rough-stalked Meadow grass (Fig. 6). It is an early grass; and its creeping roots protect it against the effects of great drought; but the same creeping roots enable it to occupy the whole of the land, to the exclusion of superior grasses; and its cultivation, except, perhaps, on land too dry for better kinds, cannot be recommended.

No. 22. WOOD POA. (*Poa nemoralis*.)

This is a slender-growing grass, found to thrive well under trees; and may, therefore, with advantage be sown in woods and plantations, sufficiently thinned to permit it to grow. What has been called an evergreen variety of this grass, has been highly recommended as an excellent pasture-grass for land of medium quality. We have cultivated it, and are disposed to think favourably of it for this purpose, and also as a grass for laying down pleasure-grounds: the same observations apply to a highly-extolled grass, about equal in value to this—the “*Poa nervata*.” With respect to the Wood Poa, Taunton says:—“Where it (*Poa nemoralis*) had been planted on trenched soil in my plantations—which have now grown so thick as to have smothered all other grasses under them—this has increased and overspread the whole space: its rich nutritious quality, its beautiful and perpetual verdure, and, above all, this quality of flourishing under a dense cover of trees, appear to me to render it particularly valuable for the purpose of rendering wooded lands profitable.”

CLOVERS, ETC.

Although Clover, Lucerne, and Sainfoin are not “true grasses,” yet they are, or rather they have been, called “artificial grasses,” and must receive, at least, a passing notice.

Upwards of one hundred and sixty clovers are enumerated in botanical works; of these, only the Red and

White clovers and Trefoil are generally cultivated as farm crops.

Much difference of opinion exists, as to whether the common broad-leaved Red Clover—which farmers consider a biennial—be really different from the Cow-grass, or what farmers call Perennial Red Clover. Botanists characterize both as perennials, yet endeavour to draw distinctions, which, in our opinion, do not hold good; and we are much disposed to consider them one and the same plant.

Red Clover will not bear to be repeated at short intervals on the same ground; and this well-known fact has been variously accounted for—some supposing that an excrementitious matter is given off by the roots which must be taken up by other kinds of plants, or at all events dissipated, before clover will succeed again on the same ground; others, that clover quickly appropriates to itself the gypsum, and other ingredients in the soil, and cannot succeed again until a fresh supply has been disengaged from the land, or added by manure or otherwise. Be this as it may, it is found that seven or eight years should be allowed to intervene between two crops of clover.

If sown alone, as it sometimes is, whether with or without a corn crop, two stone of seed is about the proper quantity for an Irish acre, but we much prefer sowing a portion of Rye-grass with it, as suggested under the head Perennial Rye-grass.

White Clover (the Irish shamrock) is never sown alone; from six to ten pounds of seed per Irish acre being added to the mixture of grass seeds intended for laying down land to permanent pasture.

Lucerne has not hitherto engaged the attention in this country to which its merits entitle it. On limestone soil, with a dry subsoil, provided it (the subsoil) has been loosened, and that the ground be rendered rich and free from weeds, this plant produces a great weight of green feeding, of which horses are particularly fond; cows also thrive well on it. It should be sown thinly in shallow drills, fifteen inches apart, and thinned to stand from an inch to four inches plant from plant, according to the strength of the ground. Twelve pounds of seed will be found sufficient for an Irish acre.

Sainfoin is still less cultivated, and only to be recommended for limestone soils too shallow and dry for Lucerne. Four bushels, with six or eight pounds of Trefoil, is the quantity of seed for an Irish acre, broadcast.

Bockhara Clover has been recently introduced. It is a strong growing plant, requiring deep, rich, dry land, and more room than Lucerne, and in return for which it produces a greater weight of green feeding, of which horses and cows appear fond whilst it is young. It may be sown in drills at eighteen inches apart; and eight or ten pounds of seed is sufficient for an Irish acre.

In the preceding details we have constantly referred to the results of the Woburn experiments; but, previous to quoting these results, so far as they bear upon the agricultural grasses, it may be well to advert to the principles upon which the experiments were conducted. These, as we are informed by Sir Humphrey Davy, in the appendix to his *Agricultural Chemistry*, were as follows:—"Spots of ground, each containing four square feet, in the garden at Woburn Abbey, were enclosed by boards, in such a manner that there was no lateral communication between the earth enclosed by the boards and that of the garden. The soil was removed in these enclosures, and new soils supplied; or mixtures of soils were made in them, to furnish, as far as possible, to the different grasses those soils which seem most favourable to their growth;—a few varieties being adopted for the purpose of ascertaining the effect of different soils on the same plant, the grasses were either planted or sown, and their produce cut, collected, and dried at the proper seasons, in summer and autumn, by Mr. Sinclair, his Grace's gardener. For the purpose of determining, as far as possible, the nutritive powers of the different species, equal weights of the dry grasses were acted upon by hot water till all their soluble parts were dissolved, the solution was then evaporated to dryness by a gentle heat in a proper stove, and the matter obtained carefully weighed. It will be found, from the general conclusions, that this mode of determining the nutritive powers of the grasses, by the quantity of matter they contain soluble in water, is sufficiently accurate for all the purposes of agricultural investigation."

TABLE SHOWING THE COMPARATIVE VALUE OF THE MORE IMPORTANT GRASSES.

	Produce at time of flowering, per statute acre, in lbs.			Produce when the seed is ripe, per statute acre, in lbs.			Loss or gain by cutting, when in flower in nu- tritive mat- ter, in lbs.			Loss or gain by cutting, when in seed, in nu- tritive mat- ter, in lbs.			Produce of after-grass, per statute acre, in lbs.	
	Grass.	Hay.	Loss in drying.	nutritive matter.	Grass.	Hay.	Loss in drying.	nutritive matter.	Loss. Gain.	Loss. Gain.	Loss. Gain.	Grass.	nutritive matter.	Grass.
1. Cocksfoot grass,	27905	11859	16045	1089	26544	13272	13272	1451	362	—	362	11901	281	—
2. Meadow Foxtail,	20418	6125	14293	478	12931	5819	7111	461	—	17	17	8167	255	—
3. Timothy,	40837	17355	23481	1595	40837	19397	21439	3668	2073	—	2073	9328	297	—
4. Meadow Fescue,	13612	6465	7146	957	19057	7623	11434	446	—	510	510	—	—	—
5. Perennial rye-grass,	7827	3322	4494	305	14973	4492	10481	643	337	—	337	3403	53	—
6. Rough-stalked meadow grass,	7486	2246	5240	233	7827	3522	10617	336	102	—	102	4764	223	—
7. Fiorin grass,	17696	7742	9732	967	19057	8575	38293	1042	74	—	74	—	—	—
8. Hard Fescue,	18376	8269	10106	1004	19075	8575	10481	446	—	558	558	10269	199	—
9. Crested Dogtail,	6125	1837	4287	406	12251	4900	7350	478	71	—	71	4083	79	—
10. Sweet Vernal grass,	7827	2103	5723	122	6125	1837	4287	311	188	47	47	188	—	—
11. Yellow Oat grass,	8167	2858	5308	478	12251	4900	7350	430	—	—	—	—	—	—
12. Sheep's Fescue,	—	—	—	—	2445	—	—	127	—	—	—	71	6806	239
13. Tall Fescue,	51046	17866	33180	3988	51046	17866	4304	2392	—	1595	1595	3403	66	—
14. Spiked Fescue,	16335	7146	9188	765	10800	4492	10481	553	—	212	212	15654	978	—
15. Tall Oat grass,	—	—	—	—	16335	5717	33180	255	—	—	—	13612	265	—
16. Reed Poa (Poa Calamaria),	54450	19057	33392	3828	51046	12123	6397	2392	—	1435	1435	—	—	—
17. Yorkshire fog, or soft grass,	19057	6661	12395	1119	19057	3818	15246	818	—	372	372	—	—	—
18. Creeping Soft grass,	34031	13612	20418	2392	21099	8439	12959	1153	—	1238	1238	—	—	—
19. Water Poa,	126596	75957	50638	4945	—	—	—	—	—	—	—	—	—	—
20. Smooth-stalked mead.-grass,	10209	2871	7336	279	8507	3403	5104	199	—	79	79	4083	111	—

PART III.

PRACTICAL DIRECTIONS FOR SOWING GRASS-SEEDS, AND FOR THE GENERAL MANAGEMENT OF GRASS LAND.

In the preceding details we have, on several occasions, recommended what we consider the best combinations of grass seeds for various purposes; but this being a branch of the subject to which the farmers of this country have not hitherto devoted much attention, it may be desirable to treat it a little more in detail in this place. The agricultural student, who, in order to discover the best practice with respect to the kinds and proportions of grass seeds to be used under various circumstances, should consult the most eminent authors, could hardly fail to be surprised, if not bewildered, by the want of any thing like uniformity of opinion which appears to exist on this subject. Sinclair, an authority to whom the greatest deference is justly due, gives it as his opinion, that from four to five bushels of mixed grass seeds is the least quantity that can, with propriety, be sown on the statute acre; and the following would be his selection for a good well-prepared loam.

Cocksfoot grass, ...	...	...	2 measures
Meadow Fescue, ...	...	...	2 do.
Meadow Foxtail, ...	...	...	2 do.
Rough-stalked Meadow grass, ...	...	...	2 do.
Tall Oat grass, ...	...	...	$\frac{1}{2}$ do.
Meadow Catstail, ...	...	...	$\frac{1}{2}$ do.
Hard Fescue, ...	...	...	$\frac{1}{2}$ do.
Crested Dogstail, ...	...	...	1 do.
Wood Meadow grass, ...	...	...	1 do.
Rye-grass, ...	...	...	1 do.
White Clover, ...	...	...	$\frac{1}{2}$ do.
Perennial Red Clover, ...	...	...	$\frac{1}{2}$ do.
Sweet Vernal, ...	...	...	$\frac{1}{2}$ do.
Florin, ...	...	...	$\frac{1}{2}$ do.
Nerved Poa, ...	...	...	1 do.

On similar land, Curtis would sow three bushels of the following mixture, viz. :—

Meadow Foxtail,	...	...	1 measure.
Meadow Fescue,	...	...	1 do.
Smooth-stalked Meadow grass,	...	$\frac{1}{2}$	do.
Crested Dogstail,	...	$\frac{1}{4}$	do.
Sweet Vernal,	...	$\frac{1}{4}$	do.
White Clover,	...	$\frac{1}{2}$	do.
Red Clover,	...	$\frac{1}{2}$	do.

The following mixture, which would not amount to two bushels per acre, is recommended for permanent pasture by Professor Low, in his excellent "Elements of Practical Agriculture," viz. :—

					lbs.
Foxtail,	...	...	...	...	3 $\frac{1}{2}$
Catstail,	...	...	...	...	0 $\frac{1}{2}$
Cocksfoot,	...	...	...	...	5
Meadow Fescue,	...	...	...	...	2
Rough-stalked Meadow,	...	...	...	...	0 $\frac{1}{2}$
Rye-grass,	...	...	...	...	12
White Clover, 5 lbs., Red, 3 lbs., Bush Vetch, 2 lbs.—					10

34

Sinclair's recommendation of so large a quantity of grass seeds, he informs us, is founded on the results of experiments which he made for the purpose of obtaining correct information in this respect. With this view he endeavoured to ascertain the kinds and number of plants growing on a square foot of the best pastures in various districts, and the following is the astonishing result of these examinations, viz. :—In one instance, on a square foot of very rich natural meadow, he found 1,000 plants growing; 940 of them being grass, and 60 of them other kinds. In another natural meadow he found 1,090 on a square foot; of which 1,032 were grass, and 58 other plants. And in a water meadow he found 1,798 plants on a square foot; 1,702 of them being grass, and 96 other kinds!

Now, one thousand plants in a square foot affords seven to the square inch; and as one bushel of the mixture which we have given, as recommended by Sinclair, will, on an average, produce two plants to the square inch, it follows that, in order to have from seven to nine plants to the square inch, from four to five bushels of such mixture ought to be used.

In our attempts to repeat these experiments, we have never been able to observe 200 plants on a square foot of the richest pastures. We have, on the contrary, divided a single plant of Cocksfoot grass, and of Tall Fescue grass into twenty pieces, which we have planted on a square foot of very good land, and which was fully occupied by these pieces within a year; thus proving that a few plants, if the land be rich, will as fully stock it as a greater number; yet, inasmuch as the whole of the seed sown never vegetates, we greatly prefer a large to a small allowance.

The following kinds and proportions of grass seeds are recommended by Messrs. Lawson, of Edinburgh,* for permanent pasture:—

Scientific Names.	Light soils.		Medium soils.		Heavy soils.	
	with a crop.	with- out a crop.	with a crop.	with- out a crop.	with a crop.	with- out a crop.
<i>Alopecurus pratensis</i> ,	lbs. 1	lbs. $1\frac{1}{2}$	lbs. $1\frac{1}{2}$	lbs. $1\frac{1}{2}$	lbs. $1\frac{1}{2}$	lbs. $1\frac{1}{2}$
<i>Avena flavescens</i> ,	$0\frac{3}{4}$	$0\frac{3}{4}$	$0\frac{1}{2}$	$0\frac{1}{2}$	—	—
<i>Dactylis glomerata</i> , ...	3	4	3	4	3	4
<i>Festuca duriuscula</i> , ...	2	2	2	2	2	2
„ <i>elatior</i> ,	—	—	1	1	2	2
„ <i>heterophylla</i> ,	—	—	1	1	1	1
„ <i>pratensis</i> ,	2	2	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3
„ <i>rubra</i> ,	2	2	—	—	—	—
<i>Lolium Italicum</i> ,	5	6	5	6	5	6
„ <i>perenne</i> ,	6	7	6	7	6	7
<i>Phleum pratense</i> ,	1	$1\frac{1}{2}$	$1\frac{3}{4}$	2	2	$2\frac{1}{2}$
<i>Poa nemoralis</i> ,	$0\frac{3}{4}$	1	1	$1\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{2}$
„ „ <i>sempervirens</i> ,	$0\frac{3}{4}$	1	1	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$
„ <i>pratensis</i> ,	1	1	—	—	—	—
„ <i>trivialis</i> ,	—	—	$1\frac{1}{2}$	2	2	$2\frac{1}{2}$
<i>Lotus corniculatus</i> , ...	$0\frac{1}{2}$	$0\frac{1}{2}$	$0\frac{1}{2}$	$0\frac{1}{2}$	—	—
„ <i>major</i> ,	—	—	$0\frac{1}{4}$	$0\frac{1}{4}$	$0\frac{1}{2}$	$0\frac{1}{2}$
<i>Medicago lupulina</i> , ...	1	1	1	1	1	1
<i>Trifolium pratense</i> , ...	1	1	1	1	1	1
„ „ <i>perenne</i>	2	2	2	2	2	2
„ <i>repens</i> ,	4	5	4	4	4	5
	$33\frac{1}{2}$	$38\frac{1}{2}$	36	$40\frac{1}{2}$	$38\frac{1}{2}$	44

* Treatise on the Cultivated Grasses and other Herbage Plants. Blackwood; Edinburgh. 1843.

KINDS AND PROPORTIONS OF GRASS SEEDS RECOMMENDED UNDER VARIOUS CIRCUM- STANCES.

The efforts of the eminent writers, whose recipes for sowing down land to permanent pasture we have given above, appear to have been directed to produce the nearest possible resemblance to the best natural pastures, in which will undoubtedly be found the whole of the kinds they have named, together with others strenuously recommended by older authors, such as rib-grass (*Plantago lanceolata*) and yarrow (*Achillea millefolia*), now justly considered as weeds which occupy the room of more profitable herbage: but some of the best meadows which we have ever seen—those yielding six and even eight tons of hay per Irish acre—have been composed of few kinds of grasses; and, were it otherwise, we ought to act in this as we do in other branches of farming, and not content with the productions of nature as formed to our hand, endeavour, by perseverance in skilful management, to render them more subservient to our purposes.

We quite agree with the conductor of the Woburn experiments, that we shall in vain look for the greatest supply of nutritive herbage at all seasons from any one kind of grass; to obtain this we must have recourse to variety, but the variety need not, in our opinion, be extensive.

I. For permanent pasture and meadow, in land ranging between the best and that of medium quality, whether loam, moor, or clay, provided it be dry, deep, free from weeds, and in good heart, we would sow, whether with or without a corn crop—

	Per statute acre.	Per Irish acre.
Cocksfoot,	... 7 lbs.	... 11 lbs.
Foxtail,	... 3 "	... 5 "
Meadow Fescue,	... 10 "	... 13 "
Timothy,	... 5 "	... 8 "
Red Clover,	... 5 "	... 8 "
White Clover,	... 5 "	... 8 "
	35 lbs.	53 lbs.

II. For permanent pasture and meadow in land, ranging between good and medium, in an upland and exposed situation, the conditions as to dryness, depth, freedom from weeds, and condition as before :—

			Per statute acre.		Per Irish acre.
Meadow Fescue,	...	...	8 lbs.	...	14 lbs.
Crested Dogtail,	...	...	8 "	...	14 "
Yellow Oat grass,	...	...	3 "	...	5 "
Hard Fescue,	...	...	5 "	...	8 "
White Clover,	...	...	5 "	...	8 "
Trefoil,	...	...	5 "	...	8 "
			<hr/> 34		<hr/> 57

III. For thin or light land, intended for sheep, in an elevated and exposed situation, same as the above, substituting Sheep's Fescue for Meadow Fescue, and Sweet Vernal grass for Yellow Oat grass.

IV. For meadow and pasture on a loamy soil intended to be irrigated :—

			Per statute acre.		Per Irish acre.
Foxtail grass,	...	...	5 lbs.	...	8 lbs.
Timothy,	...	...	11 "	...	14 "
Rough-stalked Meadow grass			11 "	...	14 "
			<hr/> 27 lbs.		<hr/> 36 lbs.

V. On a moory soil for the same purpose :—

Timothy	11	...	14
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And the surface of the land strewed thickly with stolons of Fiorin grass, to be covered with a little earth and rolled in.

We have seen water meadows in which all these grasses, viz., Foxtail, Timothy, Rough Meadow grass, and Fiorin (and some others, but which we considered, in comparison with these, as mere weeds), seemed to contend for the possession of the ground; and equally excellent meadows where one or other predominated almost to the exclusion of all others. A sheaf of pure Foxtail grass has *this season* been forwarded to the Royal Dublin Society's Agricultural Museum, from a water meadow in the north of Ireland, which has received no other manure than water—not the best, as it

takes its rise in a bog—for twenty years, the hay of which has been let on the foot at £9 per acre (Irish, we suppose). Fiorin grass has been known to produce on irrigated meadows, upwards of 10 tons per Irish acre: and it is the principal grass of the Corcasus along the Shannon, an immense extent of which produces 8 tons of hay per Irish acre on an average of seasons. Timothy and Rough Meadow grass we have also known to produce enormous crops when irrigated. Would that these and similar instances which have fallen under the observation of thousands, could excite attention to our rivers, streams, and the sewerage of our towns, with a view of rendering them available to the public weal!

VI. For alternate husbandry, when it is intended that the land shall continue only one or at most two years in grass, nothing can for a moment be compared to Italian Rye-grass, provided the land be suited to it, viz., rich, deep, dry, and well sheltered; on such we would sow three or even four bushels per Irish acre, with a few pounds, say from six to eight, of Red Clover, with or without a corn crop.

In land less favourably circumstanced, Perennial Rye-grass and Red Clover—one bushel of the former, and 20 lbs. of the latter; or 2 bushels of Rye-grass and 14 lbs. of Red Clover (we prefer the latter) per Irish acre—may be recommended; but if the land is to remain even three years in grass, we would substitute a bushel of Cocksfoot for one of the two bushels of Perennial Rye-grass.

VII. For laying down pleasure-grounds to be kept in short grass.—As we have observed, under the head Sheep's Fescue, we do not agree with those who recommended that grass alone, or in considerable proportion, for this purpose. The best mixture, in our opinion, is—

	Per statute acre.		Per Irish acre.	
Crested Dogstail grass,	...	11 lbs.	...	18 lbs.
Yellow Oat grass,	...	5 "	...	8 "
Wood Meadow grass,	...	5 "	...	8 "
Sweet Vernal grass,	...	3 "	...	5 "
		<hr/> 24		<hr/> 39

VIII. For sowing under trees, the Wood Meadow grass and the Cocksfoot are to be preferred ; at the rate of one bushel of the former, and two of the latter per Irish acre.

IX. For ill-reclaimed land, the soft grass, or Yorkshire Fog, or the sweepings of the hay-loft may be good enough; and on wet land which cannot be drained, and which is liable to be covered for a portion of the year, the Water Poa, Reed Canary grass, and Fiorin, being planted, will make a return, in excellent herbage, of greater value than that with which much good land is at present encumbered.

This branch of the subject might be treated much more at length, but we trust enough has been advanced to indicate to farmers the course they ought to pursue ; and, as tending to this, we insert a tabular view of the comparative weight of the more important grasses, and number of seeds in an ounce :—

Scientific names.	Average weight per bushel.	Average number of seeds in one ounce.
	lbs.	
Dactylis glomerata,	11½	40,000
Alopecurus pratensis,	5½	76,000
Phleum pratense,	44	74,000
Festuca pratensis,	13	29,000
Lolium Italicum,	15	27,900
„ perenne,	26	16,000
Poa trivialis,	15½	216,000
Festuca duriuscula,	9½	39,000
Cynosurus cristatus,	26	28,000
Avena flavescens,	5	118,000
Agrostis stolonifera,	13	500,000
Bucetum loliaceum,	15	24,700
„ elatius,	14	20,500
Poa nemoralis <i>sempervirens</i> ,	15½	133,000
Anthoxanthum odoratum,	6	71,000
Holcus lanatus,	7	95,000
Medicago lupulina (lucerne),	63¾	16,000
Trifolium minus, <i>vel</i> <i>filiforme</i> (trefoil),	64½	54,000
„ <i>pratense perenne</i> (red clover),	64	16,000
„ <i>repens</i> (white clover)	65	32,000

ON THE PREPARATION FOR AND SOWING GRASS SEEDS.

Throughout our observations we have invariably indicated the necessity of putting land into a proper state before it is laid down to grass.

If wet, even during the winter, it should be drained; if shallow, and that it is possible at any reasonable expense to do so, it should be deepened; if foul with weeds, it should be cleaned by summer fallow or well-handled drill crops; and if poor it should be enriched—these requisites being secured, and good clean grass seeds, of suitable kinds, being obtained, an abundant return may be expected; whilst to sow indifferent, or even good seeds on ill-prepared or unsuitable land is a species of ill-advised economy, calculated only to lead to loss and disappointment.

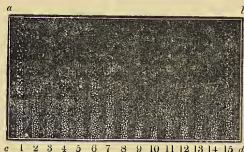
The question, whether it is more advantageous to sow grass seeds with or without a corn crop, has engaged much of the attention of agriculturists; and the opinion that they should be sown without a crop appears, although slowly, to gain ground. Crops of hay, sufficient, however, to satisfy farmers generally, are produced from grass seeds sown with corn; and, this being the case, it is not probable, at all events, that the poor man will soon relinquish a practice that brings an immediate return. But, whether sown alone or with corn, the land should, previous to committing the grass seeds to it, be reduced to a fine tilth, not only at the surface but as deep as the plough and grubber can penetrate, and the corn (if to be sown with a corn crop) being sown and harrowed in, the heavy seeds, such as the clovers, Timothy, and Crested Dogtail grasses being mixed together, may be sown broadcast with the hand, or, what is much better, with a machine constructed for the purpose.

A simple machine for sowing the heavier grass seeds is a long narrow box, something like an eavegutter with a lid. The bottom is divided into compartments of five or six inches in length, and holes sufficiently large to permit the easy escape of the seeds are formed in the bottom of each compartment, the holes are closed by

means of a slide. It may be eight or ten feet long, and, being suspended by a strap over the shoulders, the sower, by a lateral motion, scatters the seed as evenly as if they were deposited with the finger and thumb. The quantity of seed permitted to escape is regulated by the slide. The heavier seeds being sown, the lighter are to be mixed evenly and sown with the hand, or with the brush sowing-machine.

A large portion of the grass seeds usually sown on the old careless plan of harrowing them in with the corn, is destroyed by being buried too deep. That this is so, was proved by direct experiment by the Messrs. Drummond, of Stirling; who, having covered the seeds of various grasses at all depths between three inches and nothing, obtained a result which is exemplified by the following woodcut:—

“The seed was sown on the 13th of May, 1842, on an open border of light soil, the cover regulated by a frame standing three inches in depth at *a b*, and level with the surface at *c d*, the border four feet wide: the white dots show where the seeds have braided, and the proportionate thickness of the plants in the different depths; thus proving to a certainty the great loss sustained by the ordinary mode of covering, or rather burying the seeds.



“1, Perennial Rye-grass; 2, Timothy grass; 3, Meadow Fescue; 4, Red Clover; 5, White Clover; 6, Yellow Clover; 7, Rib grass; 8, Meadow Foxtail; 9, Hard Fescue; 10, Smooth-stalked Meadow grass; 11, Cocksfoot; 12, Crested Dogstail; 13, Wood Meadow grass; 14, Fiorin; 15, Italian Rye-grass.

"The Perennial Rye-grass alone has grown at three inches deep, but after one and a half inch the plants decrease more than half."

GRASS-SEED HARROWS.

Amongst the many inventions and improvements for which agriculturists are indebted to Mr. Smith, of Deanston, is the web or chain-harrow for covering grass seeds; this consists of a great number of little cast-iron disks, which revolving on their edges, penetrate a short way into the surface of the ground, thereby effectually breaking the little clods which could not be acted on by the ordinary harrow, and effectually covering the seeds. A good substitute for this scientifically-constructed implement is the bush-harrow, not as ordinarily constructed with strong bushes, fastened at random in a heavy harrow, the projecting limbs of which plough up the ground, displacing much of the seed, burying more, and producing that patchy appearance in the newly-laid-down clover and grass fields, so indicative of slovenliness on the part of the farmer. The best kind of bush-harrow for this purpose is formed of two pieces of wood which may be of any length to answer the width of the ridge (if the ground be laid down flat as it ought to be in well-drained and subsoiled land, the bush-harrow may be ten or twelve feet long), these pieces being made fast by end-pieces, and being parallel to each other at six or eight inches apart, bushy white thorns are drawn through, and their ends fastened by a cord to the upper part of the front bar. This is found to be amply sufficient for covering the seeds, and the operations of sowing are finished by rolling the ground.

As a rule which hardly admits of an exception, grass seeds should always be sown either alone or with the first corn crop after manure; to sow them, as is too much the practice, with the second, or any subsequent corn crop, is the sure way to incur a much greater loss than the additional corn crops can compensate.

Grass seeds may be sown at any time during the spring, summer, or autumn, but April and August are decidedly the two best months in the year for that purpose.

ON TRANSPLANTING GRASS, CALLED ALSO
INOCULATING LAND.

The length of time that usually intervenes after even good land is laid down with grass seeds, before it becomes equal to the best pastures which have never, or at least for a long period, been broken up, induced the attempt to effect the object by transplanting pieces of pastures which produce the best herbage, on land properly prepared for their reception: with this view, sods at intervals of nine inches or a foot, and three or four inches in width, are raised by a plough; these are cut or broken into pieces three or four inches square or so, and these pieces being laid down on the prepared ground at a foot apart each way, and beaten or rolled in, the grasses growing on them take root, so that in a year after the inoculation the land is fully stocked with the best grasses. The several operations, exclusive of the preparation of the land, which is the same as for grass seeds, have been estimated in England at about 50s. per statute acre. August, September, October, and April are good months for this work. Clover, or any kind of grass in which the sods are deficient, may be sown on the ground before putting on the sods.

The following opinion is given of this plan in the *Code of Agriculture*:—

This plan seems to be well calculated to promote the improvement of light soils, not naturally of a grassy nature, for the grasses and their roots being once formed on a rich soil, will probably thrive afterwards even on a poor soil; therefore, where permanent pasture is desirable, the plan cannot be too strongly recommended; and if it were to answer on peat after the surface was pared for the reception of the plant, and burnt to promote their growth, it would be a most valuable acquisition to sheep farmers in many districts of the country. Thus far Sir John Sinclair, but from facts related by Sinclair, of Woburn, it appears to be a plan of little or no merit, only brought into notice by its novelty.—*Hor. Gram. Wob.* 2nd edition, pp. 420, 421.

We shall conclude the subject of sowing grass seeds by the insertion of the following list of prices, furnished by respectable Dublin seed-merchants:—

PRICES OF GRASS SEEDS, AS SOLD IN DUBLIN.

		Per bushel.		Per pound.
Cocksfoot, ...	...	£0 4 0	...	£0 0 4
Foxtail, ...	...	0 5 0	...	0 1 0
Timothy, ...	...	1 0 0	...	0 0 8
Meadow Fescue, ...	...	0 9 0	...	0 0 9
Florin grass, ...	...	0 12 0	...	0 1 6
Common Perennial Rye-grass, ...	...	0 3 6	...	0 0 0
Pacy's, ...	...	0 5 0	...	0 0 3
Stickney's, ...	...	0 5 0	...	0 0 3
Italian, ...	...	0 7 0	...	0 0 6
Rough Meadow grass, ...	...	0 14 0	...	0 0 10
Tall Fescue, ...	...	0 12 0	...	0 1 0
Hard do., ...	...	0 10 0	...	0 1 0
Sheep's do., ...	...	0 18 0	...	0 1 6
Crested Dogtail, ...	...	0 16 0	...	0 1 2
Yellow Oat grass, ...	...	0 9 0	...	0 2 0
Sweet Vernal grass, ...	...	0 8 0	...	0 2 0
Yorkshire Fog, ...	...	0 1 0	...	0 0 4

ON THE MANAGEMENT OF GRASS LAND.

The inquiry, whether newly-laid-down grasses should be pastured or mown the first year, has been variously answered by farmers; some preferring to pasture it, others fearing that by so doing many of the young plants would be drawn out. Both science and the best practice, however, incline to the former mode of treatment; pasturage with light stock, by keeping down the flowering stems, strengthens the root, and causes the plant to extend laterally, and, by thus sooner occupying the ground, to prevent the growth of seedling weeds; on the other hand, if left to be mown, the energy of the plant is exhausted in producing stems and flowers, seedling weeds grow on with the grasses, and when the whole has been mown, light and air are admitted to both, showers fall, and a struggle commences between the now awakened grasses and the weeds, which too often terminates in the former maintaining possession of a large portion of the surface. Neither should the young grasses be closely pastured the first year, lest, by being obliged to bite too close to the ground, the sheep may pull up the young plants, which there is not the least danger of their doing if the ground

be only moderately stocked. These observations apply with still greater force to young grasses: in the autumn of the year in which they are sown, they may advantageously be depastured with sheep in dry weather, but should, on no account, be mown.

TO MAINTAIN GRASS LANDS IN THE MOST PRODUCTIVE STATE.

This is effected by pasturage, by manuring, by irrigation, or by warping, all of which may, however, be referred to manuring. Pasturage withdraws very little from the land in the shape of milk, butter, cheese, flesh meat, or wool, in comparison to that removed by the hay crop; so little, that dry land constantly fed by sheep or cattle, provided the manure of the cattle be regularly scattered on the surface, continues to improve, without the addition of extraneous manure; whilst, on the contrary, that which is constantly mown, unless its fertility be restored by manure, becomes annually deteriorated. We have known instances indeed, in which such is the aptitude, so to speak, of the land to produce grass, that for a long series of years it has yielded an annual crop of hay, never receiving a bit of manure, except that deposited by the cattle when eating down the aftergrass; but these are rare cases, and like the instances of land producing twenty crops of corn in succession, without "rest" or manure, are more indicative of the folly of the owners of such land, than of the uselessness of manure.

Well-managed irrigated lands, it is well known, may be mown annually for an unlimited period without receiving any other manure than that supplied by the water, and so may flooded lands along rivers, from the overflow of which mud is deposited; but where neither of these means are available, grass lands should only be mown every third year, or, if oftener, manure or compost should be applied. The question then arises, what is the most profitable application in the way of manure? And this would be answered by farmers in the vicinity of great towns where hay brings a high

price, by saying, that the richest cow-house or slaughter-house manure, applied at the rate of from thirty to forty tons per acre, will produce the best return; but as a general rule, we would rather advise to reserve this rich manure for the production of green crops, and to keep up the fertility of the meadows by composts formed of lime and earth, or of bog-stuff and earth, which have been saturated with liquid manure. A compost formed of a barrel of lime to two tons of earth, and applied at the rate of from 50 to 100 tons per Irish acre, either in November or February, has seldom failed amply to repay the expenditure. Tank liquid has also been applied early in spring with excellent effect.

BONE MANURE.

This has been advantageously applied to grass lands. In a paper published in the journal of the English Agricultural Society, we have the following account of it:—

“Within the last nine years Lord Combermere has supplied his tenantry (upon the Combermere estate in Cheshire) with bones for upwards of 600 statute acres of their pasture land, at a cost of about £10 an acre. The land before the bones were applied was not worth more than from 10s. to 15s. an acre—it is now well worth from 30s. to 40s. His lordship charges the tenantry 7 per cent. upon the outlay—they would gladly pay 10 per cent. rather than not have the bones. Old sour turf upon a clay subsoil is the land that answers best to manure with bones, though I have seen them used upon a dry friable soil, and a sandy substratum with success. I have never known them to fail when there is a strong turf and the land free from water. Upon Lord Combermere's estate bones are not allowed to be put upon land until it has been down in grass at least seven years. I have seen them tried upon clover of the first year, and upon land that has been down in grass two or three years; but in very few instances with a successful result. From 30 to 35 cwt. is the quantity

used upon a statute acre, according to the quality of the land ; or if bought by the bushel, 1 bushel of bones to 64 square yards ; if the land is very poor, 90 bushels to a statute acre. An imperial bushel of bone-dust should weigh from 45 lbs. to 47 lbs., if ground fine enough : I prefer them ground to about the size of a walnut. It is now twenty years since I first saw bone-dust applied to pasture land, on a field adjoining Lord Combermere's estate. At the time the bones were put upon the land it certainly was not worth more than 10s. an acre ; and though so long a period has elapsed since the field was manured with bones, it is now worth 35s. per acre, though the land is not quite so good as it was five years ago. Bones are considered the cheapest of all manure for mowing grounds. Eight years ago I manured part of one of my mowing fields with bones, 35 cwt. to the acre : the land has produced me a good crop of hay every year since, quite equal to the other part of the field, which has been manured with good farm-yard dung every two years. Once in eight or nine years is quite often enough to manure mowing lands with bones ; and I am quite certain that pasture land, on which bones have been applied, never will, so long as it remains in grass, return to the state it was in before the bones were put on.

"In the year 1828 one of Lord Combermere's tenants manured 5 acres of pasture land with boiled bones, and in the same field two acres with unboiled bones : both answered well, and at this moment I do not observe any difference : both still retain their fertilizing qualities."

GYPSUM AS A TOP-DRESSING FOR CLOVER AND GRASS LAND.

This mineral has long been used as a top-dressing for clover land, with results very variable, in Great Britain, but generally favourable in America, where it has been much used. 100 parts or pounds weight of it contain, according to chemists, from 32 to 43 of sulphuric acid, 30 to 33 of lime, and 24 to 38 of water.

Mr. C. W. Johnston, in a prize essay on the applica-

tion of gypsum to the artificial grasses, published in vol. ii. of the "Transactions of the English Agricultural Society," states that it should not be considered as a stimulant, but as an essential food of some kinds of plants, such, for instance, as Lucerne, Clover, Sainfoin; and accounts for its want of beneficial action, as frequently reported, by supposing that in these cases the land already contained a sufficient quantity of it; but he observes, when treating on this subject—"It is not necessary for the farmer to have his soil analyzed to determine the probable advantages of applying gypsum to his Clover and other grasses; there are several easy observations which will readily indicate to him the nature of the case: thus, when he finds those fields which once produced luxuriant crops of Red Clover or Sainfoin, will no longer yield them in abundance; if he notices that the young plants spring up very numerously, but die away as the summer advances; if he finds that his fields will only grow Clover successfully once in eight or twelve years, and that his neighbours tell him his land is *tired* of Clover, or *clover-sick*; he may then safely conclude that his crops have gradually exhausted his land of sulphate of lime; and he may, with every confidence of success, apply a dressing of gypsum, by scattering it evenly over the ground at the rate of 2 cwt. per acre, taking care to choose a wet morning for the application;* and this may be done at any season of the year, but it is best either in April or the first days of May."

Innumerable instances of the successful application of gypsum to Clover might be advanced, but the following shall suffice:—

Mr. Smith, of Highstead, states that he found the greatest benefit from the use of gypsum to his clover leys; for where the simple soil produced 1 ton only per acre of hay, the portion of the same soil to which 5 bushels per acre of gypsum had been applied, yielded

* Surgeon Antisell, in a paper on the nature and properties of gypsum (see FARMERS' GAZETTE, Aug. 10, 1844), cautions us against the use of it in wet, but directs to scatter it on a dewy morning.

3 tons—the first yielding only 20 lbs. of seed, while the latter produced 105 lbs. Mr. Smith, too, first noticed what observations have since confirmed—that cattle, horses, &c., always prefer the clover growing on the gypsumed portion of the field to any other. The same remark is made by those who spread coal ashes, which contains a considerable quantity of this earth, on their grass leys.

SPECIFIC, OR HAND MANURE, AS TOP-DRESSING.

Genuine Peruvian guano, at the rate of two cwt. to the statute, or three to the Irish acre, mixed with a few ton of good earth, and scattered evenly over the ground in moist weather, early in April or immediately after the meadow has been mown, has, in general, been found to increase the produce sufficiently to reimburse the cost of the application.

Nitrate of soda costs about £1 6s. per cwt.; one cwt. and a-half is the usual application per statute acre, and this has often produced an increase of a ton of dried hay per statute acre.

Sulphate of soda costs about 16s. per cwt.; three cwt. is the usual application, often producing a result equal to the nitrate of soda; but recent experiments have shown that the best mode of applying these substances is, to mix them.

In an essay by Mr. Gardiner, steward to W. M. Fleming, of Barrochan, Renfrewshire, for which a prize of thirty sovereigns was awarded by the Highland and Agricultural Society of Scotland, and which is published in their Transactions for July, 1844, it is stated, that one cwt. and a-half of nitrate of soda, mixed with one cwt. of animal charcoal (the latter cost only 4s.), applied on the 18th of April to three years' old lea, produced an increase of upwards of 306 stones of hay per statute acre over that of a similar extent of the field, equally good, previous to the dressing; and that a still greater increase (396 stone) was obtained by the application of two cwt. of guano, one cwt. of common salt, and one cwt. of animal charcoal!

Liquid manure, which has stood for a month in the tank, diluted with an equal quantity of water, has been applied, by means of a water-cart, with the best effect. Early in spring is considered the best season for this application.

TO RENOVATE OLD AND WORTHLESS PASTURES.

Should the land be wet, it must be effectually drained, as until the stagnant water has been removed, no application can be successful: this being effected, a good top-dressing of compost, composed of earth and lime, will greatly improve it; but should the herbage be of an inferior description, the best way will be to break it up, subject it to a course of judicious cropping, and lay it down in good heart, and with the proper kind of grasses. The following method of renovating bad pastures, where it was not convenient to keep the land under the plough, has been practised, it is said, with the best effect in Scotland. The ground being drained was broken up, subsoiled, well pulverized by repeated ploughings, received a good dose of lime, and was immediately laid down with grass seeds; by this means the original grasses were only partially destroyed, and an excellent pasture was obtained.

It not unfrequently happens that even dry land is stocked with an inferior description of grasses, in which case, either in April or August, let the surface of the pasture be well harrowed, apply a heavy top-dressing of compost of any kind, sow of the kinds of grasses desired about half the quantity which we have recommended for similar ground, bush-harrow it in, and roll the ground.

WEEDING.

Grass lands are too often permitted to produce weeds, by which the land is exhausted, and the valuable herbage diminished. Rag-weed and thistles may easily be pulled up in the early part of summer, especially after rain; docks, cow-parsnip, and similar deep-rooting plants, require the application of a dock-spade, or a crowbar with a chisel-point; the smaller weeds,

such as yellow rattle, ox-eye daisy, fairy flax, &c., will disappear if the land be rendered rich by top-dressings; crowfoot, knapweed couchgrass, and some others, when they abound in land, are only to be extirpated by breaking up the land, and subjecting it to a rotation of well-managed drill husbandry.

Ferns, which infest dry lands (Brackens—*Pteris aquilina*), may be destroyed by irrigating the land; where that cannot be effected, the leaves being broken or cut before they expand, and this frequently repeated when they spring again, the plants will die.

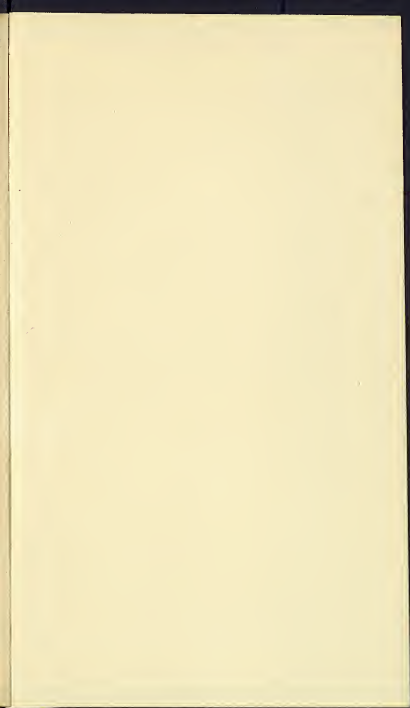
Heath may be destroyed by irrigation, or draining and liming; furze is only to be extirpated by the furze adze, mattock, &c., and the operation will be facilitated by first burning down the bushes.

Moss in pastures indicates too great moisture or overstocking; the remedy is, draining and top-dressing. An excellent way to improve poor dry pastures is, to fold sheep on them with turnips.

Irrigation and haymaking, although connected with the management of grass land, would require to be treated at considerable length: they will form important sections in a plain, cheap little work, in which we have made some progress, and which we intend to designate "FARMING MADE EASY."

In conclusion we may add, that where nothing is stated as to the duration of the grasses, they are "perennial;" and where we are silent with respect to their qualities, our silence may be received as an opinion of their want of importance, considered in an agricultural point of view.

THE END.



UNIVERSITY OF SOUTHAMPTON

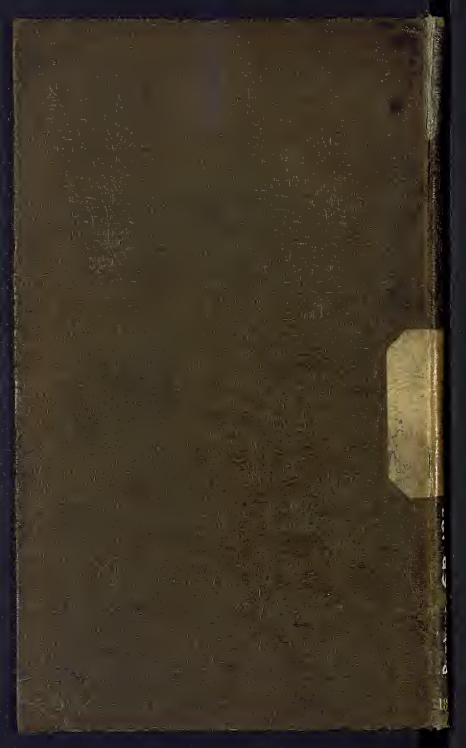
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